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FACULTY OF ECONOMICS

DOCTORAL THESIS

Gender Wage Gap and Discrimination in China

Study Program: Economics Theory

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STATEMENT

I hereby declare that I have developed the entire doctoral thesis including annexes myself. All sources of information have been listed in the references and were quoted appropriately throughout the doctoral thesis.

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ABSTRACT

The doctoral dissertation studies the determinants of the full-time employee wage for rural-urban migrants and urban residents in the Chinese labour market. It examines the difference in the gender wage gap between these two.

The doctoral dissertation employs the extended Mincer Earnings Function and Blinder-Oaxaca decomposition method to undertake an empirical analysis based on three cross-sectional data from the Chinese Household Income Project in 2003, 2008, and 2014.

The results state that the difference in wages between men and women has widened in the Chinese labour market since 2002. In comparison, the gender wage gap of rural-urban migrants is bigger. Migrating women workers suffer more unfair treatment in regards to wages. The average wage of urban residents is higher than that of rural-urban migrants. Education can increase workers' wages, with educational investment being more effective in increasing the wages of urban residents in particular. Also, the regional differences in worker wages are obvious. In addition, employment in large companies or monopoly industries, as well as in formal employment, increases workers' income.

The results of the wage decomposition report that the explained part of the gender wage gap has declined for both migrating and local workers since 2002. Furthermore, the size of the gender wage gap for those two groups is different. Gender discrimination in wages was much worse in the sub-labour market of rural-urban migrants in China between 2002 and 2013.

Education and formal employment cut income inequality and gender discrimination in China. The government should recognise the difference between these two sub-labour markets. Due to the different labour structures and worker wage determination in these two sub-labour markets, the government needs to have various and precise labour policies to improve wage equality. In the long run, reducing market access barriers and promoting the two sub-labour markets' integration, as well as adopting active labour protection policies, will cut wage differences between groups in China.

Keywords: Rural-urban migrant, Gender wage gap, China, Labour market, Labour market discrimination, Wage, Education.

ABSTRAKT

Doktorská disertační práce je věnována výzkumu determinant mezd zaměstnanců pracujících na plný úvazek, konkrétně migrantů z venkova do měst a zaměstnanců - obyvatel měst - na čínském trhu práce. Zkoumá také rozdíl v odměňování žen a mužů v těchto skupinách.

V doktorské disertační práci je k provedení empirické analýzy, založené na průřezových datech z čínského průzkumu příjmů domácností ve třech letech 2003, 2008 a 2014, využita rozšířená Mincerova mzdová funkce a Oaxaca-Blinderova dekompozice. Výsledkem provedené analýzy je, že se rozdíl ve mzdách mezi muži a ženami na čínském trhu práce od roku 2002 prohloubil. Zároveň je také vyšší rozdíl ve mzdách mezi muži a ženami u migrantů z venkova do měst. Migrující ženy jsou tedy vystaveny nespravedlivému zacházení, pokud se jedná o mzdy a průměrná mzda obyvatel měst je vždy vyšší než mzda obyvatel přicházejících z venkova do měst. Determinantou, která může zvýšit mzdy těchto pracovníků je vzdělání, přičemž investice do vzdělání jsou účinnější zejména u zvyšování mezd městského obyvatelstva. Patrné jsou rovněž regionální rozdíly ve mzdách a kromě toho se příjem pracovníků zvyšuje spolu se zaměstnáním ve velkých či monopolních společnostech, stejně jako ve státní správě.

Výsledky provedené mzdové dekompozice uvádějí, že se vysvětlená část rozdílu ve mzdách žen a mužů od roku 2002 u migrujících i místních pracovníků snížila. Také velikost gender pay gap v obou skupinách se liší. Genderová diskriminace v odměňování pracovníků migrujících z venkova do měst na trhu práce byla mezi lety 2002 a 2013 v Číně výrazně horší. Zejména determinanty jako vzdělání a zaměstnání ve státní správě však snižují nerovnost v příjmech a diskriminaci na základě pohlaví na čínském trhu práce.

Vláda by proto měla vnímat rozdíl mezi těmito dvěma dílčími segmenty trhu práce. Kvůli rozdílným strukturám práce a určování mezd na těchto dvou zdánlivě oddělených trzích práce musí vláda pro každou oblast konkrétně definovat aktivní politiku trhu práce a politiky zlepšení rovnosti mezd. Taktéž odstraňování bariér vstupu na trh a podpora integrace zmiňovaných dílčích trhů práce, stejně jako přijetí politiky ochrany pracovníků by proto přispělo ke snížení rozdílů ve mzdách mezi uvedenými skupinami zaměstnanců na trhu práce v Číně.

Klíčová slova: migrace z venkova do měst, gender wage gap, Čína, trh práce, práce,

diskriminace na trhu práce, mzdy, vzdělání

LIST OF ABBREVIATIONS

CFPS - Chinese Family Panel Studies

CHIP - Chinese Household Income Project

CHNS - China Health and Nutrition Survey

CNY - Chinese Yuan

Hukou - Resident Registration System

NBSC - National Bureau of Statistics of the People's Republic of China

WEF - World Economic Forum

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My family always cares for and encourages me; I am very grateful for their love. My beloved father passed away in the second year (2017) of my study in the Czech Republic. He was a role model for my life. The successful completion of my doctoral program study is the best memorial to him.

CONTENTS

CHAPTER 1 INTRODUCTION

The purpose of this doctoral dissertation is to study the changes in the differentials of gender wage and to examine the differences between the rural-urban migrants[1] and urban residents in the Chinese labour markets.

With China transferring from a public economy to a mixed economy, its labour market has changed. After 2000, the population and economic structure in China showed a new trend. The demographic and economic structures have changed. This has caused an impact on its labour market, such as rapid wage increases and an aging population. In response to such new changes, it is necessary to research the labour market.

Unifying the labour market is an important step to solve the problem of China's dual economic and social structure.[2] Wage decisions and wage differentials are at the core of labour market research. Therefore, studying the relevant issues for rural-urban migrants and urban residents and finding out the differences between them are necessary.

First, this doctoral dissertation describes the new features of the labour market in China between 2000 and 2015. Second, it uses microdata from the Chinese Household Income Project in 2003, 2008, and 2014, and uses the expanded Mincer Earnings Function to conduct an empirical analysis of wage determinations for the rural-urban migrants and urban residents in the Chinese labour markets. Third, this work employs the Blinder-Oaxaca decomposition to analyse the differentials of the gender wage of urban-rural migrants and urban residents respectively.

1.1 Problem description and research purpose

The labour market is the main body of labour economics. Human capital characteristics, labour market mobility and competition not only impact the efficiency of resource allocation and

[1] "Rural-urban migrants" refers to the workers whose household registration is in a rural area, who move from rural areas into cities, and who work and live in a city in China. According to deification from the National Bureau of Statistics of the People's Republic of China, the rural-urban migrants are also called as, "migrating workers in cities" which refers to workers whose household registration is in the village (the local rural area or other rural area) and who enter the urban area to work in non-agricultural industries for 6 months or more. They live in an urban area for a long time and their main income is non-agricultural.

[2] The dual economic structure refers to the economic structure in which advanced industries and traditional agriculture coexist in a developing country.

economic growth, but also affect wage determination, income distribution, and social equity.

The theory of classical labour economics comes from neoclassical economics. Employers decide work prices according to the profit maximisation principle and marginal benefits of output. Work utility preferences and labour compensation determine the quantity of labour supply. Labour force supply and demand determine the wage level to achieve market clearing.

Labour supply and demand cannot explain income inequality in the labour market. There are many factors, such as educational attainment, on-the-job training, personal experience, occupation, employment industry, marital status, and gender, etc., which affect individual wages. Mincer (1974) introduces a simple equation to express the relationship between personal income and characteristics of human capital. It is a popular model and is widely used to estimate income and earnings.

The World Economic Forum (WEF, hereafter) pointed out that the average annual income of men worldwide was USD 21,000, while the average income of women in 2017 was USD 12,000. Female workers who do the same job earn less than men. The gender wage gap is a social phenomenon. The difference in male and female wages and employment inequality challenge social equality.

Labour economists accept the Blinder-Oaxaca decomposition method to explain the differences in wages between men and women. Contemporary labour economics emphasises the impact of institutional and social factors on labour compensation and employment. The result of wage decomposition proves that the characteristics of workers observed in the labour market, such as education, age, occupation, etc., can explain part of the gender wage gap.

Before 1978, the Chinese government dominated its national economy. The residents of China were managed by the resident registration system (*Hukou,* hereafter)[3] since the 1950s. Before China's economic reforms, the government strictly controlled personal mobility and employment. At that time, the movement of private labour was illegal.

China's economic structure is a dual economic structure, with its labour market consisting

[3] The household registration system of the People's Republic of China is a household-based population management policy implemented by China since the 1950s. The household registration system proves the legality of the natural person living in the local area. The household registration system also divides the population into agricultural or rural and non-agricultural or urban household registration to control population migration.

of the rural labour market and the urban labour market, which are isolated from each other. The "dual-labour market" was introduced by Lewis (1954). He believed that in economic entities, rural workers and urban workers are homogeneous. The unlimited supply of rural labour guarantees the labour demand for industrial development.

But China is very different. China's dual economic structure and its labour policies cause an isolated labour market. Locals dominate the first sub-labour market in the city, and their labour supply is less elastic. The secondary labour market in cities is competitive. Its labour supply has unlimited flexibility. Migrant workers from rural areas to cities are the participants. Urban and rural immigrants and urban residents have different jobs in cities.

Following market reforms in the 1980s, China opened up its labour market. Workers moved from rural to urban areas. Rural workers moved from primary industry to secondary industry. After 1990, Chinese workers continued to transition from state-owned enterprises to non-state-owned enterprises. It changed the employment structure of China's labour market. Employment in the informal sector has increased. However, *Hukou* still has a big impact on workers' employment in the Chinese labour market. Rural-urban migrants need a permit to work in the city. At the same time, two distinct secondary labour markets have emerged in urban areas of China.

By 2000, the labour market for rural-urban migrants was small. In 2001, China joined the World Trade Organization. The private sector began to dominate the employment of rural-urban migrants. More workers have moved from the primary industry to the tertiary. The size of the sub-labour market for rural-urban migrants grew.

The determinants of wage and the gender wage gap are a core aspect of labour market research. Before its economic and social reforms, the government strictly controlled workers' wage levels. Government regulations determined the wages of workers. Male and female workers in the same job had almost the same wages. After the 1980s, the wage gap between specific groups was a social phenomenon (Xing, 2005; Yin and Gan, 2009). After that, the wage gap between men and women has gradually expanded. In 2017, the average wage of Chinese women was 54.9% of men (WEF, 2017). For the government, achieving gender wage equality is a core of social equity.

The doctoral dissertation aims to investigate the determinants of wages of rural-urban migrants and urban residents and to describe the changes in the gender wage gap in the Chinese labour markets between 2002 and 2013. It studies the changes in the differentials of gender wage and wage discrimination against women between 2002 and 2013 in China. The doctoral dissertation takes a comparative examination of the wage differential between men and women. It also studies the difference between rural-urban migrants and urban residents.

The doctoral thesis hypothesises that with the changes in China's demographic structure and labour market, especially after it acceded to the WTO, the wage determination and gender wage discrimination of Chinese urban workers changed significantly. At the same time, due to the segregation of the urban labour market in China, there are differences between migrant workers and urban workers in the above aspects.

This work provides a new and reliable empirical analysis of gender wage differences and wage discrimination in the Chinese urban labour market.

The doctoral dissertation employs three cross-sectional data from surveys of the Chinese Household Income Project (CHIP, hereafter) finished in 2003, 2008, and 2014. The CHIP project is organised by the National Bureau of Statistics of China and is a survey project covering the income and expenditure of individuals and households across China. Those projects design the different questionnaires (for rural residents, rural-urban migrants, and urban residents separately), compile statistics and report the results separately.

The doctoral dissertation describes the contribution of relevant explanatory variables on the wage of rural-urban migrants and urban residents in the long term separately. It proves the segmentation and difference between the sub-labour market of migrating workers and the sub-labour market for local natives. By summarising the changing trends of gender wage and wage determination, this work provides suggestions to eliminate income inequality between men and women in China.

1.2 Contributions of doctoral dissertation

The doctoral dissertation is different from past studies in the following aspects.

First, to accurately study the Chinese labour market, it is necessary to study the impact of human capital and job characteristics on the long-term trends of personal wages, and use the latest data to test the changes in the gender wage gap over time. The doctoral thesis applies the

data of CHIP 2002, CHIP 2007, and CHIP 2013,[4] which are rich and new representative data. These data span ten years and reflect changes in the Chinese residents' income and employment and show the long-term changes in China's labour market.

Second, the Chinese labour market shows the coexistence of rural-urban migrant labour and urban labourers. The sub-labour market of rural-urban migrants is significantly isolated from that of urban residents. These two sub-labour markets have differences in a lot of aspects such as workers' wage determination, labour structure, etc., with the migrating workers and the urban residents having different human capital characteristics. (Cai and Du, 2011; Zhang et al., 2016; Zhao, 2016; Sun, 2017; Chen et al., 2017). To fully understand the changes in the Chinese labour market, it is necessary to compare the differences between the sub-labour market of rural-urban migrants and urban residents instead of ignoring the differences between them. This doctoral thesis differs from the previous analysis by selecting two sub-databases (migrating workers and urban residents) in the same project. It applies the same variables and regression models to examine the changes in the long run in the gender wages of rural-urban migrants and that of urban residents to point out their differences.

Third, after a long period of cheap labour supply, China's labour market has undergone tremendous changes since 2000 (Bao, 2005; Cai, 2010). It is necessary to consider the impact of changes in the Chinese labour market on workers' wages and gender wage differences. The doctoral dissertation summarises the main changes in China's labour market by analysing relevant macroeconomic data from 2000 to 2015 in China. It discusses the impact of these new labour market features on the research subjects.

1.3 Structure of the doctoral dissertation

The organisation of the doctoral thesis is as follows.

Chapter 2 describes the main characteristics of the Chinese labour market from 2000 to 2015. These include the aging population and increasing labour cost in China (see subchapter 2.1), privatisation of the Chinese economy and informal sector employment (see subchapter 2.2), labour mobility and the dual-labour market (see subchapter 2.3), and the improvement of workers' education in China (see subchapter 2.4).

[4] The last and newest CHIP is CHIP 2013 that was implemented in 2014 and released several years later.

Chapter 3 reviews the relevant theoretical approaches and discusses past empirical studies on this topic in China and around the world.

First, it states the theoretical framework of wages, human capital, labour market segmentation, and labour market discrimination (see subchapter 3.1). Second, it introduces the previous empirical studies on wage differences between men and women in some developed and developing countries (see subchapter 3.2). Third, it states some relevant studies on the labour market in some Asian countries (see subchapter 3.3). Fourth, it reviews some empirical studies on the wage determinants, the gender wage gap, and gender wage discrimination in the Chinese labour market from both sides of labour supply and labour demand (see subchapter 3.4). Fifth, it summarises the methods and data used in some representative studies in the past (see subchapter 3.5).

Chapter 4 introduces the data and methodologies used in the doctoral dissertation.

First, it describes the microdata of CHIP 2002, CHIP 2007, and CHIP 2013. The explanatory variables used in this work are explained (see subchapter 4.1).

Second, it states the methods used. This thesis chooses the Mincer Earnings Function and carries out the Ordinary Least Squares regression method as well as the method of quantile regression based on the entire hourly wage distribution of workers to examine determinants of female and male wages, respectively. It employs the Blinder-Oaxaca decomposition to analyse wage differences between men and women in the Chinese labour market (see subchapter 4.2).

Chapter 5 presents the empirical results.

Firstly, it presents the statistical result of this doctoral dissertation (see subchapter 5.1).

Secondly, it provides empirical results. These include the results of the basic regression model, as well as the results of the classical and extended Mincer Earnings Function. It reports the results of Blinder-Oaxaca decomposition and the results of the quantile regression of workers' wages. (see subchapter 5.2). In addition, it reports the results of the Blinder-Oaxaca decomposition and the results of the quantile regression of workers' wages. (see subchapter 5.2).

Chapter 6 is the conclusion of the doctoral dissertation.

In this section, the conclusions and policy implications are presented first (see subchapter 6.1). Subsequently, it points out the limitations of this thesis and possible further work (see subchapter 6.2).

CHAPTER 2 LABOUR MARKET IN CHINA

This section presents and summarises the changes in – and the main features – of China's labour market from 2000 to 2015.[5] After 2000, China began to enter an aging society, and the cost of workers has risen. With the privatisation of China's economy, the size of informal sector employment has expanded. The scale of rural-urban migrants has increased gradually in the Chinese labour market. Since 2000, the human capital of workers in China's labour market has improved significantly.

2.1 Aging population and increasing labour cost

Due to the application of the *"One-Child Policy"*[6] in the last 30 years and the improvement of living conditions, Chinese society has moved into a new stage of the low fertility rates, the low mortality rates and the low growth rates of its population. In China, the scale of the younger generation has been declining and the size of the senior population has been increasing in recent years. The Sixth Countrywide Population Survey in China shows that the share of residents who over 60 of all citizens was 13.32% and the share of residents who over 65 was 8.87% in 2010. The Chinese population will reach its peak in a few years, and maintaining the stability of labour supply in its labour market presents a challenge to the Chinese government (Lam et al., 2015). A report from the United Nations (2015) states that the proportion of Chinese residents aged 15 to 59 will fall from 65.10% in 2000 to 62.10% in 2025. Thus, China has entered an aging society.[7]

The demographic structure and the labourer's structure keeps changing. According to the National Bureau of Statistics of China (NBSC, hereafter), the scale of young people under the age of 14 in China dropped from 22.89% in 2000 to 16.52% in 2015. The proportion of Chinese

[5] In the doctoral dissertation, data used for empirical analysis includes the samples from CHIP 2002, CHIP 2007 and CHIP 2013. To correspond to survey data used in this study, macro data from 2000 to 2015 are selected to state the background of China's labour market.

[6] The "one-child policy" was designed to control China's rapidly growing population and to encourage family planning. It was implemented as a policy by the government at the beginning of the 1980s and it was officially terminated in 2015.

[7] According to the standard of the United Nations, an aging society refers to a region that has the proportion of the elderly who are over 60 reaches 10% of the total population or the share of the elderly who are over 65 accounts for over 7% of the total.

residents between the age of 15 to 64 dropped from 74.53% in 2010 to 73.01 % in2015. China's population aged 65 and over accounted for 10.4% of the population in 2015, compared to 6.96% in 2000, shown in Figure 2-1.

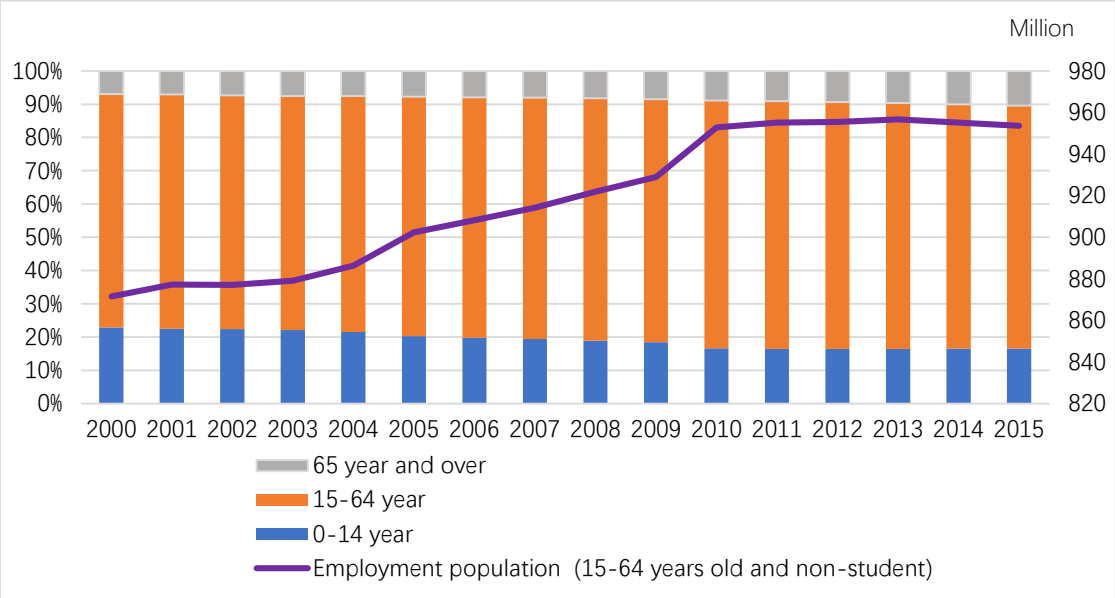

Figure 2-1 The age structure of China's population and number of employment population from 2000 to 2015

Source: China Statistical Yearbook 2000 to 2015, NBSC

The development of China's economy and its labour market has led to a large internal migration of labour. Hundreds of millions of workers have moved from rural areas to urban areas since the 1980s in China. The labour supply led to a slow and steady increase in China's employment population before 2010. The number of employed people increased from 871 million in 2000 to 952 million in 2010. The demographic changes in China are visible and the share of the young population declined in its labour market. The rapid growth of China's employment-population has stopped since 2010 and remains stable, shown in Figure 2-1.

As China has gradually entered an aging society, the median age of China's population has increased rapidly since 1990. The median age of China's population rose from 24.7 years in 1990 to 29.8 years in 2000 and then jumped to 35.2 years in 2010. In 2015, the median age of China's population was 37 years. Although China's total employed population remained stable since 2010, the aging population and declining worker surplus means that the "*Lewis Turning*

Point" [8] is coming (Cai, 2010).

The coming of the "*Lewis Turning Point*" is caused by the shortage of labour supply or potentially by other reasons. Wang (2005) pointed out that the distorted economic structure, the imperfect function of China's labour market and the consequence of government policies have accelerated the arrival of the "*Lewis Turning Point*". At the same time, with the deepening of China's social reforms, the government has given more support to the economic development in rural areas and less-developed areas. This leads more workers to stay and work in rural areas instead of moving into the city. The younger generation of rural-urban migrants shows the differences in personal characteristics of human capital compared with their parents and they have different attitudes towards working in the city (Li and Guo, 2011).

After 2000, workers' wages in the Chinese labour market increased significantly. From 2000 to 2016, the average nominal wage of urban residents had increased from CNY[9]10,000 per year to CNY 68,900. The average minimum social wage in China had doubled from 2004 to 2014 (People's Daily, 2015). The differences in the average wage between businesses with different ownership are obvious. The average annual nominal wage of workers in state-owned enterprises was CNY 72,538 in 2016. However, it was much higher than that of workers in collective enterprises (it was CNY 50,527 in 2016), shown in Figure 2-2.

[8] The *"Lewis Turning Point"* refers to a turning point in the labour market, in which growth of labour demand exceeds that of labour supply, and wages start to rise (Lewis, 1954; Cai and Du, 2011).

[9] CNY refers to Chinese Yuan.

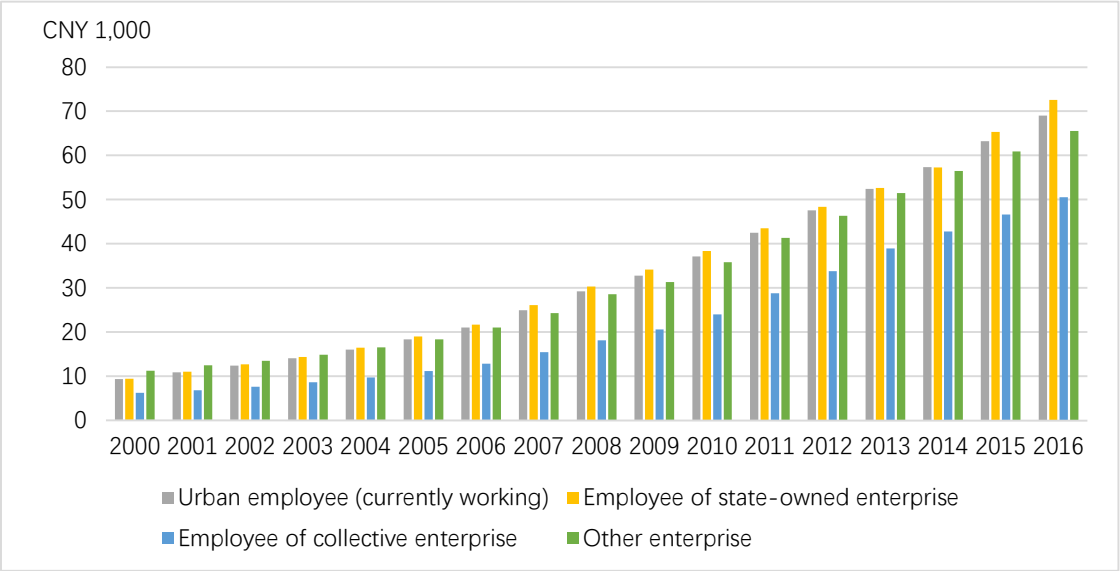

Figure 2-2 The average annual nominal wage of workers from 2000 to 2016

Source: China Statistical Yearbook 2000 to 2016, NBSC

After 2000, the wages of workers in various sectors increased rapidly. Moreover, wage inequality between different production sectors is also serious. The top-two sectors with the highest salary are the *Information Transmission, Computer Service and Software* sector and the *Financial Intermediation* sector. The annual average nominal wage of workers in those two sectors was CNY 122,478 and CNY 117,418 in 2016. Between 2003 to 2016, the workers in the sectors of *Agriculture, Forestry, Animal Husbandry and Fishery* and *Hotels and Catering Services* had fewer annual average wages among all national economic industries. The differentials of wages between various sectors have increased, see Figure 2-3.[10]

[10] Sector1-Agriculture, Forestry, Animal Husbandry and Fishery; Sector2-Mining; Sector3-Manufacturing; Sector4 -Production and Distribution of Electricity, Gas and Water; Sector5-Construction; Sector6-Transport, Storage and Post; Sector7-Information Transmission, Computer Service and Software; Sector8-Wholesale and Retail Trades; Sector9-Hotels and Catering Services; Sector10-Financial Intermediation; Sector11-Real Estate; Sector12-Leasing and Business Services; Sector13-Scientific Research, Technical Services, and Geological Prospecting; Sector14-Management of Water Conservancy, Environment and Public Facilities; Sector15-Services to Households and Other Services; Sector16-Education; Sector17-Health, Social Securities and Social Welfare; Sector18-Culture, Sports and Entertainment; Sector19-Public Management and Social Organization.

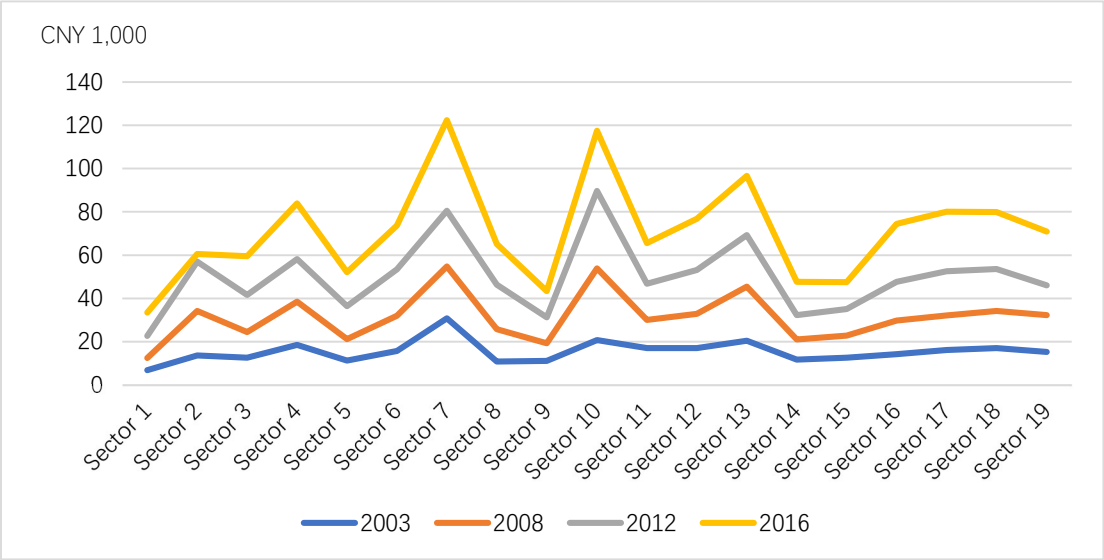

Figure 2-3 The average wage of workers in sectors

Source: China Statistical Yearbook 2000 to 2016, NBSC

The Chinese society has reached the "*Lewis Turning Point*". As China's population ages, the decline of the surplus of the labour force increases the cost of industrial workers. The wages of workers are rising, and it constrains the sustainable expansion of the Chinese economy.

2.2 Privatisation of China's economy

Before 1978, state-owned enterprises dominated the national economy in China. With the process of the Chinese economy becoming market-oriented, the non-state-owned enterprises and the businesses of multiple-property ownership created a huge demand for the labour force in China.

In 1990, the total number of Chinese residents working in private enterprises and in individual businesses was 22.75 million, with the total number of all employed people being 647.49 million. The private sectors employed less than 4% of all Chinese workers. In 2000, workers in private enterprises and individual businesses accounted for 11% of all employed people. In 2015, this proportion rose to 36%, with 280 million workers in the private sectors. The development of private enterprises is remarkable. Among all employed people, the share of workers in urban private enterprises rose from 1.76% in 2000 to 14.43% in 2015, a sevenfold increase, as shown in Figure 2-4.

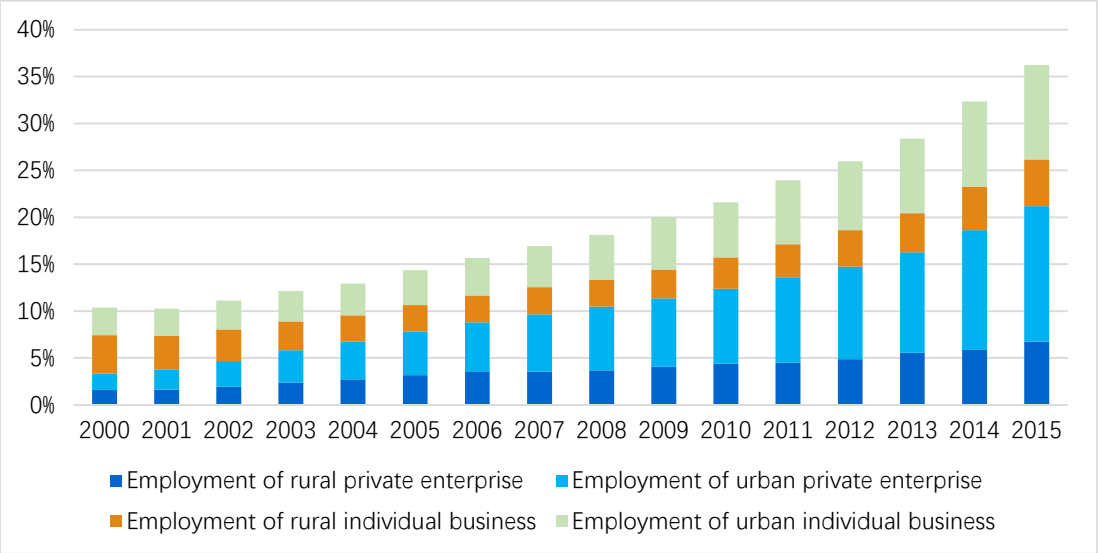

Figure 2-4 The Share of employment of private enterprise and individual business from 2000 to 2015

Source: China Statistical Yearbook 2000 to 2015, National Bureau of Statistics of China

In the last few decades, more and more rural-urban migrants have moved from rural areas to urban areas to get a better job. They serve in a variety of industries instead of the agricultural sector and work in enterprises of different ownership. In 2000, there were 357.68 million workers (50% percent of the entire employed population) in the primary industry. In 2015, 28.3% of all employed people were in the primary industry, equating to 219.19 million, see Figure 2-5.

By the end of 2017, there were over 27 million private enterprises and 65 million individual and private businesses in China (Jiang, 2018). These private enterprises and businesses account for 90% of all Chinese enterprises. Non-state-owned entities provided more than 80% of all jobs in the Chinese labour market (Wuhan University, 2018).

Figure 2-5 The share of employed population of three sectors from 2000 to 2016

Source: China Statistical Yearbook 2000 to 2016, NBSC

The development of the private sector and the privatisation of the Chinese economy have led to a significant increase in employment in the informal sector in the labour market. The development of China's service industry has promoted the rapid development of employment in the informal sector in the labour market and created opportunities for migrants to find jobs in the cities. The number of employees in the tertiary industry continues to grow.

Employment in the informal sector is an important part of China's labour market. As the main form of migrants' employment in the urban labour market, working in the informal sector is beneficial to both supply and demand sides of the labour force.

2.3 Mobility of labour force

Over the past few decades, China's economic growth has provided a huge demand for workers, especially in the service sector. According to NBSC's definition, China's labour force includes all workers in rural and urban areas under the household registration system (*Hukou*). Labour mobility has led to China's internal migration from rural areas to urban areas. The workers who have the rural '*Hukou*' move from the countryside into cities and work in the city as the rural-urban migrants. The urbanisation process in China is remarkable with more and more rural-urban migrants working and living in cities (Rush, 2011). Compared with the urban residents, rural-urban migrants have disadvantages in the characteristics of human capital.

The transfer of workers from the state-owned enterprises to the non-state-owned

enterprises and the transfer of workers from the second sector to the third sector have changed China's labour market structure. With the development of China's economy, the rural employment-population had dropped from 490 million in 2000 to 370 million in 2015. The employed population in the urban area was 231 million in 2000 and increased to 400 million in 2015, see Figure 2-6.

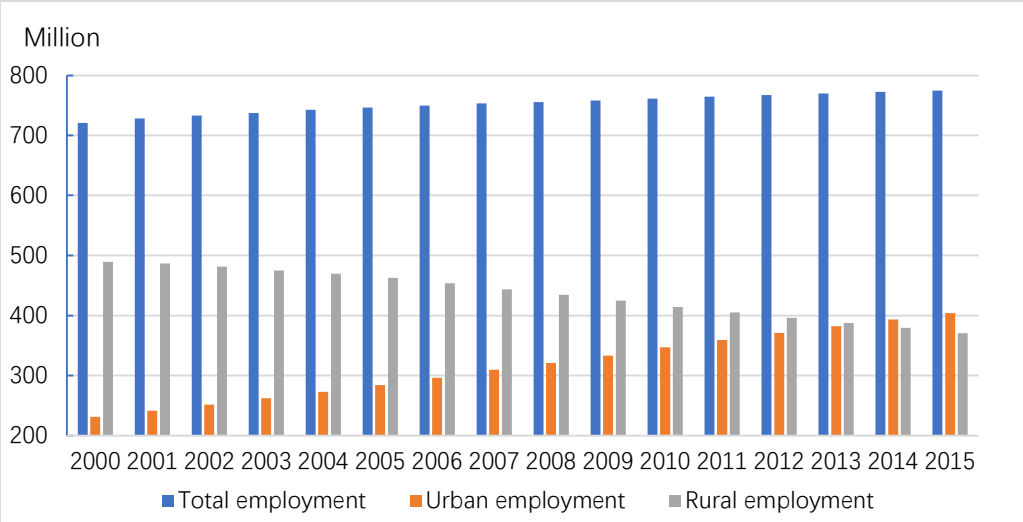

Figure 2-6 The employed population of the rural and urban areas in China from 2000 to 2015

Source: China Statistical Yearbook 2000 to 2015, NBSC

Compared with other regions in China, East China[11] has huge advantages in its economic development and social openness. The workers continue to move from West China and Central China to East China. Many urban-rural migrants from the western and central provinces to the eastern provinces have ensured the demand for private enterprise workers in China's coastal areas. Due to the supply of abundant and cheap labour, China's labour-intensive industries have achieved rapid development. Thus, East China absorbs the workers who moved out of West China.

The results from the Sixth Population Survey in China show that each province of Sichuan, Guangxi, Guizhou and Chongqing in West China and Anhui, Hunan, Hubei and Jiangxi in

[11] According to the definition by the China Health Statistics Yearbook, East China includes Liaoning, Beijing, Tianjin, Hebei, Shandong, Shanghai, Jiangsu, Zhejiang, Fujian, Guangdong and Hainan; Central China includes Heilongjiang, Jilin, Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan; West China includes Inter-Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shanxi, Gansu, Qinghai, Ningxia, and Xinjiang in the mainland of China.

Central China from 2000 to 2010 had a net outflow of the population of more than 2.5 million. The net outflows of the population in Anhui and Sichuan province exceeded 16 million during this decade. From 2000 to 2010, each of the provinces of Fujian, Tianjin, Jiangsu, Beijing, Shandong, Jiangsu and Guangdong had a net inflow of population of over 2 million. The top-three provinces of net inflows of the population had an increase of population by over 38 million totally, see Figure 2-7.[12] It shows the regional inequality in labour mobility.

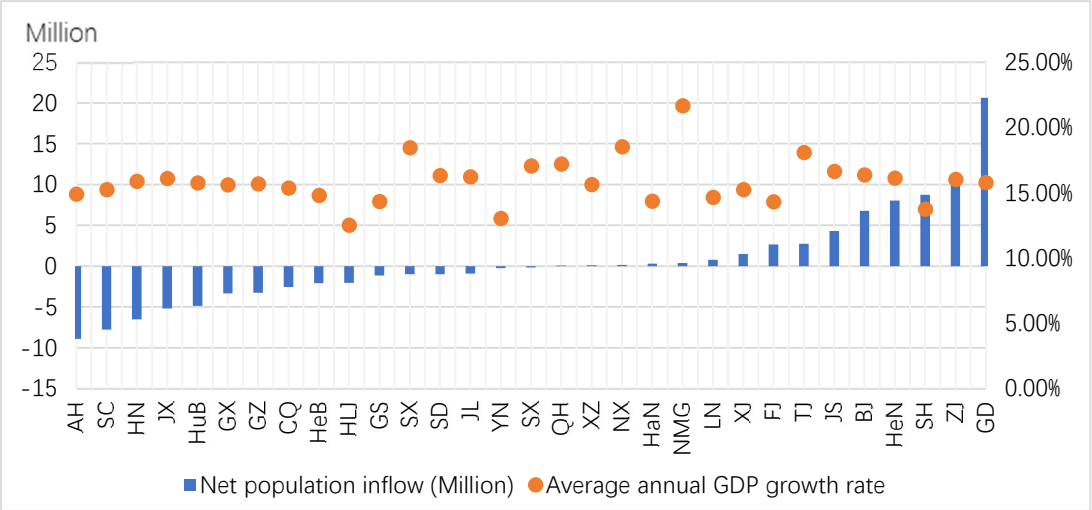

Figure 2-7 The net population inflow of 31 provinces between 2000 and 2010

Source: The Sixth Population Survey (2010), NBSC

Meanwhile, the size of the migrating workers kept changing between 2000 to 2015. The situation of the internal migration of Chinese workers shows two different stages. In the first stage, the size of residents in developed regions such as Beijing and Guangdong province had increased significantly from 2000. In the second stage, the population size in developed regions and coastal provinces in China declined sharply in 2010 and maintained this later, shown in Figure 2-8.

[12] Here, AH, SC, HN, JX, HuB, GX, GZ, CQ, HeB, HLJ, GS, SX, SD, JL, YN, SX, QH, XZ, NX, HaN, NMG, LN, XJ, FJ, TJ, JS, BJ, HeN, SH, ZJ and GD represent Anhui, Sichuan, Hunan, Jiangxi, Hubei, Guangxi, Guizhou, Chongqing, Hebei, Heilongjiang, Gansu, Shanxi, Shandong, Jilin, Yunnan, Shanxi, Qinghai, Xizang, Ningxia, Hainan, Inner Mongolia, Liaoning, Xinjiang, Fujian, Tianjin, Jiangsu, Beijing, Henan, Shandong, Jiangsu and Guangdong province, respectively.

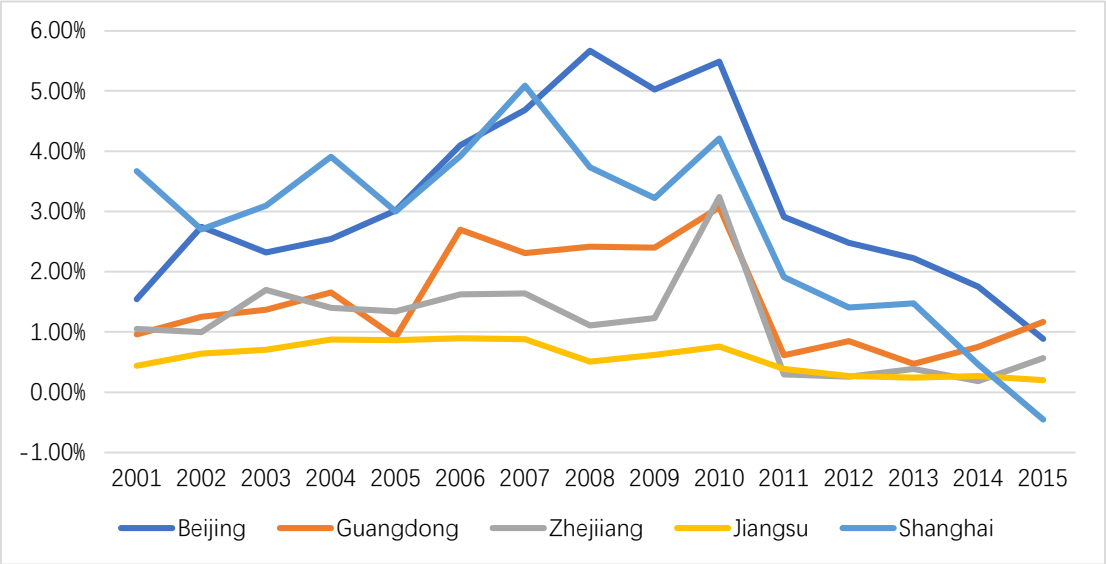

Figure 2-8 The change in the residents in five developed provinces and municipalities in China between 2001 to 2015

Source: China Statistical Yearbook 2001 to 2015, NBSC

Rush (2011) points out that East China has a smaller size of the inflow of migrants between 2008 to 2009 compared with that of past years. One possible explanation is the impacts of the global crisis which has damaged the economy and reduced employment in the labour market. Another reason is that social and economic conditions in the central and western regions have improved significantly. The reduction in the number of migrants in China's coastal areas pushes up the cost of local workers.

2.4 Improvement of workers' education

In 2000, the number of fresh graduates from junior college and college was about 940,000 in China. It was 6.8 million in 2015. The scale of high school graduates had increased from 3 million in 2000 each year to 8.3 million in 2008 and has remained stable since then, as shown in Figure 2-9. The human capital of Chinese workers has improved significantly.

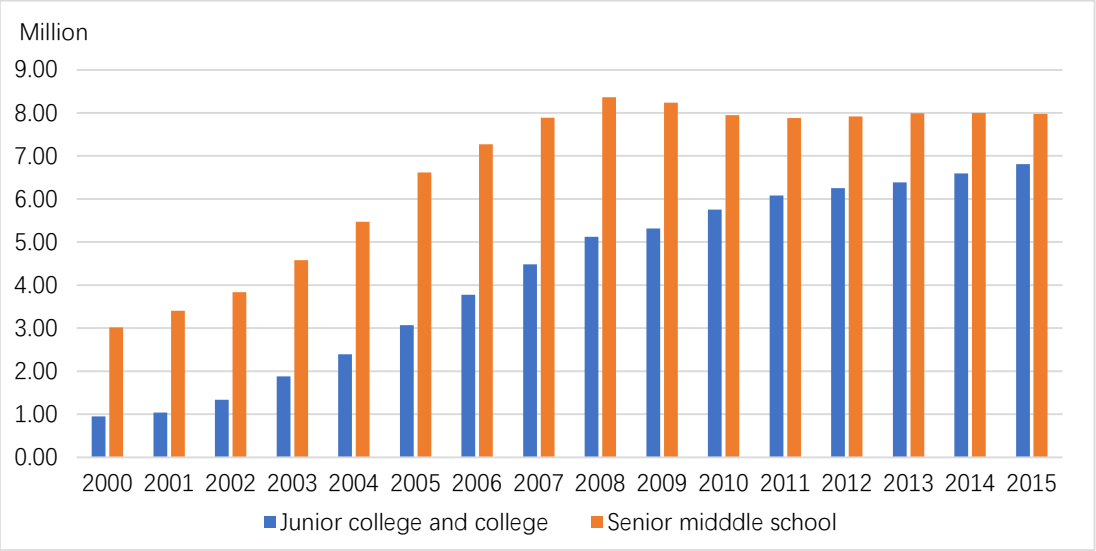

Figure 2-9 The size of graduates of senior middle school, junior college and college between 2000 to 2015

Source: China Statistical Yearbook 2000 to 2015, BNSC

Before the mid-1990s, the Chinese government uniformly arranged employment for all college graduates. Since 2000, the policy to expand higher education in China has provided opportunities for the younger generation to continue learning rather than entering the labour market as low-skilled or low-education workers. In 2017, China had achieved full gender equality in the terms of " Enrollment of secondary education" and "Enrollment of tertiary education" (WEF, 2017). However, with the increasing supply of educated workers and the expansion of college education, it becomes more difficult for new college graduates to get a job. A larger amount of high education shows a negative impact on the first contracted salary for graduates.

In 2003, the average salary of Chinese urban society was CNY 1,164 per month, which was about 50% of the first contract salary of college graduates in that year. Since 2003, the salary advantage of fresh graduates with higher education has declined. In 2009, the salary of fresh graduates with the education junior college education and college education accounted for 56% and 84% of the average wages in China's urban society, respectively. Those two ratios then dropped to 51% and 77% in 2015. The average wages of the first contract of workers who have a master's degree or a doctoral degree are higher than the average wage in China's urban society. The wage differentials between the highly educated graduates and other workers have

declined gradually, as shown in Figure 2-10.

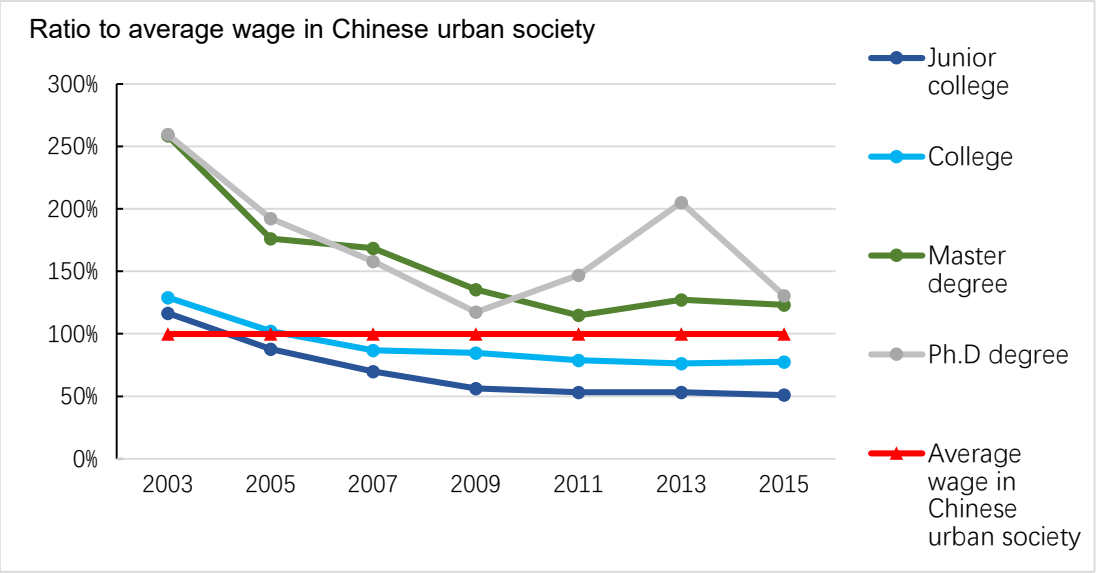

Figure 2-10 First contracted wage of graduates and the average wage in China's urban society from 2003 to2015

Source: Survey and Statistics of the Employment of College Graduates. Peking University.

There are many different reasons that could cause a change in the wage of workers. The scarcity of high-education workers is decreasing. As the supply of high-education talents increases, the wage of graduates' first job drops. However, the improvement of the human capital of employment-population positively affects China's sustainable development in the long term (Wu and Zhao, 2010; Yao et al., 2013).

In 2004, the Chinese government implemented *The Minimum Wage Policy*, and the average wage of workers gradually increased (Ma et al., 2012). In 2007, the implementation of *The New Labour Contract Law* has strengthened workers' employment protection and improved the equality in wages in China, especially for low-wage groups.

CHAPTER 3 LITERATURE REVIEWS

This section reviews the literature about this subject. First, it introduces the theoretical framework of wage, human capital, labour market segmentation and discrimination in the labour market. Second, it summarises the previous studies on this issue in China and abroad.

3.1 Relevant theory of labour economics

3.1.1 Wage and wage theory

Usually, the wage is money paid to a worker for work performed. It refers to the monetary remuneration paid by the employers to the employees according to the quantity and quality of output, the law or labour contract and on a daily, monthly or piecework basis. Basically, wage rates are decided by the market supply and demand of the labour force, the local policy or regulation and the traditional culture of the region.

Wage theory attempts to explain the determination of wages of workers. The classical economics school believes that wages are the price of labour, and it must be equal to the value of the means of subsistence required to maintain this labour (the value needed to sustain the life of the worker). Adam Smith (1723-1790), David Ricardo (1772-1823) and other classical economists stated that, for workers who need to rely on their working, wages must be slightly more than the minimum money required for their subsistence, and to ensure that workers can support their families and raise their children. This theory is to be known as the subsistence theory of wages. Karl Marx (1818-1883), an advocate of the labour theory of value, pointed out that labour is also a commodity, and the price of this commodity is determined by the socially necessary labour time required to produce it (Hu, 2005; Song, 2011). The price of wages as a labour commodity is also limited by the relation between supply and demand, and the situation of market competition. Supply and demand of labour force, along with competition in the labour market, makes wages fluctuate around the value of labour.

In the 19th century, American economist John Bates Clark (1847-1938), explaining from the perspective of labour demand, stated that marginal productivity is another factor that determines wages (Hu, 2005; Song, 2011). According to the marginal productivity theory, due to the law of diminishing marginal returns, the enterprise profit increases with the increase of factors and then decreases. The principle of using labourers for enterprises aiming at profit

maximisation is that the marginal cost is equal to its marginal income to determine the labour price.

Alfred Marshall (1842-1924) combined the ideas of classical economics with the marginal theory and established a theory of equilibrium wage. He believed that wages are determined by both supply and demand prices of labour. The marginal productivity of labour determines the price of labour demand, and the labour cost of production and the leisure utility determines the price of supply (Hu, 2005; Song, 2011).

Some economists have suggested that wages and work conditions are determined by the relative bargaining strength of employers and employees. Trade unions replace the individual worker and monopolises the supply of labour. The wage rates are the result of the negotiation between unions and employers. This is the bargaining theory of wages.

The institutional school denies that market factors play a decisive role in wage and explains wage determination from the perspective of institutional factors. They emphasise that nonmarket factors (such as institutional factors, legal factors, historical factors, social and ethical factors, etc.) are the main factors affecting social and economic life. They believe that the real labour market usually is segregated and shows incomplete competition. The wage rate is not simply determined by the rule of supply and demand but also affected by institutional factors. The institutional school believes that the wage rate of workers depends on the industry or department that the workers are working in and the human capital owned by those workers. The institutional factors dominate the wages of workers.

The efficiency wage theory is accepted by some contemporary labour economists. They believe that companies that pay higher wages to workers will benefit from more efficient operations than expected. The worker's wage should be higher than that when the number of labour supply and labour demand is balanced. Slightly higher wages ensure the nutrition and food for workers in poor countries, and healthy workers are more productive. The high wage in developed countries reduces labour mobility, and high-wage companies can reduce the frequency of employee turnover, thereby reducing the time and cost of hiring and training new staff. The quality of employees depends on the wages paid to them by the company. High wages can ensure the quality of employees and increase the efforts and efficiencies of workers.

Martin L. Weitzman introduced the sharing economy and sharing wage in his book, *The*

Share Economy: Conquering Stagflation, in 1984. According to the share wage theory, workers' wages should be variable to reflect the companies' profit levels and operating conditions. Wages should be related to certain performance indicators and could change as the company's income changes. This theory focuses on the wages of workers in the field of income distribution in order to improve the status of workers in the distribution of wealth. In the labour market, the contract between the worker and the employer should be no longer about the wage per hour, but about the share of the enterprise's income agreed by both parties.

3.1.2 Human capital theory

The classical statement of human capital is to present the human capital as "the physical resource of production" or "the component of productivity" as other natural inputs used in the production process. Human capital is the stock of knowledge, personal skills and other factors in the process of production. People can increase their personal productivity or the one's output of production through the investment (e.g. personal time or money) on human capital (e.g. the education, on-the-job training, or off-the-job training). Human capital is not a tradable resource, it is unique and is not detachable for individual workers.

In the eighteenth century, Smith pointed out that labour skills determine workers' labour ability. Labour skills can only be improved by education and training. Education directly benefits students and their families who paid the education expenses. "*The expence of the institutions for education and religious instruction, is likewise, no doubt, beneficial to the whole society*" (Smith, 1776). The study somewhat concerns human capability, maintaining that it costs money to have knowledge.

In the 1960s, Theodore W. Schultz (1902-1998) proposed that human capital is the main reason to promote the growth of the national economy. He believed that education is one kind of investment as a form of capital and stated that the quality of the population and the investment of knowledge determine the economic development and the future of human beings (Schulz,1960; Holden and Biddle, 2017). Schultz stated that human capital is a kind of capital, which is expressed by the quantity and quality of workers, that is, the knowledge level, technical level, working ability and health status of workers, and it is the sum of these values. Human capital, which is formed by investment, plays an important role in social production as do land, capital, and other physical elements.

Gary S. Becker conducted a micro-analysis on the relationship between human capital and personal income distribution. According to the statement of Becker (1993) made in his book *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education,* that education and training are the most important investments in human capital. Human capital closely relates to personal income, family, and economic development. Additional investment in human capital will result in changes in output. Becker (1962) stated that the wage reflects the capacity of individual human capital or the characteristics of personal jobs in the labour market. The earlier or current investment in education or job training increases the worker's knowledge and skills, and therefore the earning will be enhanced in the future. Considering the individual wage, human capability relating to job and other factors could influence the wage of a worker.

Jacob Mincer stated that human capital investment, such as the time spent in training, is a rational choice based on the present value of individual earning in a person's life in his book "*Investment in Human Capital and Personal Income Distribution*" in 1958. "*The differences in the length of training result in percentage differences in annual earnings"* (Mincer, 1958). In 1974, Mincer presented the Mincer Earnings Function, which is a classical modern microanalysis of the relationship between individual earning and investment in education and personal experience in the labour market. His study points out that education, experience, and on-the-job training positively contribute to the income of individual workers.

3.1.3 Labour market segmentation

The labour market segmentation theory asserts that the difference in labour supply is the cause of labour market segmentation. Labour market segmentation refers to the formation of sectoral differences in the labour market due to social and institutional factors as while the labour markets are non-competitive. This theory advocates promoting the labour market integration by developing education and training, improving human capital, and reducing the quality difference of the labour force.

This theory is based on the principles of institutional economics. The labour market theory believes that the labour market is divided into different parts due to the influence of the system. The labour market includes two different parts, the primary labour market, and the secondary labour market. Education shows a significant positive correlation with wages, but it only works

in the primary labour market, not in the secondary labour market (Bosanquet and Doeringer, 1973; Dickens and Lang, 1985). Different workers enter different labour markets and have different jobs and payments (Bosanquet and Doeringer, 1973; Dickens and Lang, 1985; Chen et al., 2006; Chen and Zhang, 2010).

According to the labour market theory, the wage level of an individual depends mainly on the labour market in which they work. The primary labour market provides professional positions in large companies and enterprises as well as in large institutions. Those employees have stable jobs, higher wages, good promotion opportunities, and good working conditions. The secondary labour market provides working positions in small companies and businesses. However, those employees have unstable jobs, low wages, and poor working conditions. The two markets are relatively closed and separated. The labourers rarely move to each other.

Some research states that the labour market in which employees can work in has a significant relationship with their gender, age, ethnicity, and education. Generally, the workers in the primary labour market are men, older people, white people, and workers with higher education levels. The workers in the secondary labour market are mainly women, young people, people of colour and workers with lower education levels.

According to the theory of labour market segmentation, the workers in the secondary market show the behavioural characteristics of such as laziness, lack of time management skills, difficulty in cooperating, and so on. None of this meets the requirements of the primary labour market. The quality and preference of the labour force restrict the entry of labour force into the primary labour market. As a result, even if workers improve their education, they still have difficulty finding jobs in the primary market. An early study finished by Reder (1955) indicates that the skills required in different industries or occupations have a different marginal rerun in the United States. The improvement of workers' education level helps the worker to access the job position but decreases the wage rates in the industry or occupation. The skill marginal return to wage differentials has declined since the 1900s. The industrial structure and other labour demand factors, as well as institutional factors, have led to labour market segmentation. The policy suggestions include improving market competition and systems to promote the integration of the labour market.

A typical phenomenon of labour market segmentation is the dual-labour market in

developing countries. The dual-labour market is based on the dual economy structure of a region. “Dual-economy” means that the economy of a developing country consists of two different economic sectors. One is the traditional sector and the other is the modern sector. The huge differences in labour efficiency of production between the industrial and agricultural sectors lead to the segmentation of the labour market. The classical study in this field of the dual-labour markets consists of the Lewis model and the Todaro model, which both focus on the urban and rural labour market segmentation.

W. A. Lewis introduced the “dual-labour market” in his work “*Economic Development with Unlimited Supplies of Labour*” in 1954. Lewis (1954) assumes that the workers from the countryside and workers from the city are homogenous. In the dual economic development of an unlimited supply of labour, the modern sector has absorbed a large amount of labour from the traditional sector, while urban workers' wages have remained unchanged for a long time. The Lewis model emphasises developing urban industrial sectors to absorb surplus labour from rural areas, then promote the integration of urban and rural labour markets.

Harris and Todaro (1970) introduce a labour mobility model that includes the factors of the migration decision of rural labour to urban areas and employment probabilities. The model assumes that some workers are unemployed in cities in developing countries and there is no surplus of rural labour. As a result of labour mobility, the number of unemployed in the cities has increased and rural labour shortages have occurred. It would affect the development of agriculture negatively. The motivation for agricultural workers to move to cities depends mainly on expected income differences between urban and rural areas. The greater the difference, the more people flow into the city. The Todaro model advocates increasing agricultural labour productivity, reducing the income gap between the agricultural sector and non-agricultural sectors, then promoting the integration of urban and rural labour markets (Zhou, 2001).

Many labour economists have conducted empirical tests on labour market segmentation through data analysis. Bosanquet and Doeringer (1973) compared the labour markets of the United Kingdom and the United States. They analysed the age income curve and job stability of the first and second labour markets. The results confirm the differences between the two secondary labour markets in the United Kingdom and the United States. The existence of labour market segmentation is real both in the United Kingdom and the United States. However,

compared with the United States, the structure of the primary and secondary labour markets in the UK is not perfect, and the differences between the two markets are relatively small and unclear.

Dickens and Lang (1985) tested the dual market in the United States and found that the primary labour market and secondary labour market have different wage-setting mechanisms and that there are two distinct sectors of the labour market.

McNabb and Psacharopoulos (1981) used census data in the United Kingdom and divided the British labour market into a primary labour market and a secondary labour market based on the occupational category. They used the Mincer Earnings Function to calculate the return of education on workers' wages. The results show that the educational attainment and work experiences have significant positive relations with the income of workers both in the primary labour market and the secondary labour market. However, the rate of educational return and work experience to workers' wages in the primary labour market was slightly higher than that in the secondary labour market. In the primary labour market, working years had a positive effect on increasing workers' income, but this had almost no effect in the secondary labour market.

3.1.4 Theories of discrimination

According to the United States Equal Employment Opportunity Commission, there are various types of discrimination in the labour market. The discrimination based on gender, race and other factors is a fact in the labour market around the world. These types of discrimination include age discrimination, disability discrimination, national origin discrimination, race/colour discrimination and sex-based discrimination, etc. Labour market discrimination includes discrimination in wages, discrimination in employment and occupational discrimination.

Gender discrimination in the labour market involves treating someone, such as an applicant or employee, unfavourably or unfairly because of their gender. Wage discrimination refers to employees who perform the same job but have lower wages than others. Discrimination in employment means that under the same conditions, even if workers have better labour capability, they are still rejected by employers for other reasons, thus increasing their unemployment rate. Occupational discrimination means that in the labour market, even if some workers are fully capable, they are restricted or barred from accessing certain occupations

or have a lower position in the same occupation.

There are usually two factors that cause differences in people's wages. One kind of factor reflects the differences in human capital characteristics between workers, and the other is a non-market factor. Under the market-based wage setting system, the improvement of personal human capital can increase the workers' wages. In modern labour economics, wage discrimination exists when different workers (men and women, or minorities and no minorities) with equal productive characteristics are paid unequally (Ehrenberg and Smith, 2011). Differences in the wages caused by the non-market factor between two specific groups is wage discrimination or wage premium. It is a consequence of the lack of a reasonable payment system or the existence of non-market prices in the labour market.

However, there is no generally accepted economic theory of discrimination. Previous theories include the taste for discrimination model, statistics discrimination theory and the crowding model in the labour market.

3.1.4.1 The taste for discrimination model

The discrimination in the labour market is to appraise some workers' characteristics without being related to their productivity. The earlier work on discrimination is from Becker's (1957) *The Economics of Discrimination*. Becker's "taste-based" model is the discrimination against a specific group which has equal skills but is prejudiced in terms of earnings or opportunity of employment. This kind of discrimination is likened to "taste", which signifies the employer's preference for what they pay to different workers. The personal-prejudice model supposes that there is a preference existing in employers, customers, and employees. More specifically, this discrimination is the "inefficient taste-based discrimination" (discrimination without economic reasons) (Ehrenberg and Smith, 2011).

3.1.4.2 The statistics discrimination theory

Phelps (1972) and Arrow (1971) introduced the statistical consideration when they discussed the "taste for discrimination". They believed that the "taste-based discrimination" was caused by certain economic reasons ("efficient taste-based discrimination").

The theory of "statistical discrimination" states that discrimination against a specific group is caused by information asymmetry in the labour market. The individual worker is judged by the employer incorrectly on the level of the average characteristics of a group that worker

belongs to rather than the personal characteristics of an employee (Aigner and Cain, 1977). Due to the information asymmetry, the employer cannot identify efficiently and perfectly the individual characteristics. The productivity of an individual worker in a specific group is assumed to be equal to the average level of productivity (as a signal of every individual in this specific group) (Ehrenberg and Smith, 2011).

3.1.4.3 The crowding model

The crowding model states that unfair wage is a consequence of the imbalance of labour supply and demand due to the occupation segregation. Men and women with equal characteristics have a different proportion of employment for a specific occupation in the labour market. As women are crowded into certain types of jobs and occupations, they can only receive lower wages (Bergmann,1971). Lower wages for women is good for businesses, which makes it impossible to eliminate occupational segregation or occupation crowding. The reasons for these non-competing groups include the social custom, acquired differences between men and women, etc. (Ehrenberg and Smith, 2011). It is difficult to change the situation of crowd discrimination.

3.2 Empirical research in countries outside of Asia

An important feature of inequality between men and women in the labour market is the gender wage gap, in which the average wage of men is higher than that of women. The previous studies draw different conclusions due to different samples, different methods and different times of their study.

3.2.1 United States

In the United States, education is one of the important factors affecting wages. Early research shows that women have a low level of education and it affects women's employment opportunities. It has caused women to have a low working wage, with lower social and economic status (Becker, 1962; Mincer, 1974). A study from Psacharopoulos (1981) pointed out that, in the United States, the "*rate of return to higher education has been virtually constant at the 11% level between 1939 and 1969, in spite of the tremendous college expansion that occurred during the 1960's*". After 1970, the rate of return to higher education had dropped from 8.8% in 1970 to 5.3% in 1976 in the United States. The newest article released by Psacharopoulos and Patrinos (2018) states that schooling remains to benefit the whole society.

The average return to private educational attainment per year is 8.8% in the last 60 years (from 1950 to 2014) globally. The increase in returns of private higher education challenges the issue of financing and equity. Females have higher average returns to schooling than males, and it is necessary to improve the young female education.

During the 1970s to 1980s, the inequality in wages and skills dramatically increased in developed countries such as the United States. The effects of education, occupation, and age on the differential of the wage have increased. Earnings of college graduates and other advantaged degrees rose significantly. The top end of wage distribution has expanded the inequality in wages. The real age of low-wage workers had decreased from the 1970s to the 1990s and wage inequality had increased in the 1980s and 1990s (Katz, 1999). In fact, wage inequality increased from the 1970s to the 1980s in the United States (Melly, 2005). Dickens and Lang (1985) reported that in the primary labour market, the education attainments and workers' income is significantly positively correlated; in the secondary labour market, the number of years of education has no significant relationship with workers' income. In the primary labour market, working years have a positive effect on increasing workers' income, but working years have almost no effect in the secondary labour market.

In 2016, F. D. Blau and L.M. Kahn published an article with data from the Michigan Panel Study of Income Dynamics (PSID) to analyse the situation and trend of the gender wage gap in the United States from 1980 to 2010. The results show that the gender wage gap declined over this period. However, general factors of characteristics of human capital only explained a small part of the gender wage gap in the United States by 2010. The wage gap between occupation and industry is more important on this issue in the United States compared with the other factors of human capital. They express that the changes in the gender wage gap show different rates at different points of the wage distribution. In 2010, the gender wage gap at the top end of workers' wages distribution was significantly larger. The reason is that wage differentials between men and women at the top of the wage distribution declined more slowly than that at the middle and bottom.

Well-educated and skilled workers have advantages in wages in the transition of industry and occupation. The differential in wage caused by education attainment has increased (Katz et al., 1993). Differentials of the characteristics of personal human capital and the increasing

market price for the human capital in the labour market contribute to rising the inequality in wage between men and women. McConnell et al. (2014) indicate that “education pays”, meaning high-education workers gain the higher average annual earnings than less-educated workers of the same group in the United States.

Goldin et al. (2017) used data from Longitudinal Employer-Household Dynamics of the United States from 1995 to 2008 to prove that the gender wage gap widens over the lifecycle of people. High-education workers, such as college graduates, have a more significant increase in the gender wage gap than those workers less educated. The 80% increase in the gender wage gap occurs in the first stage of their work experience (the first 6 years after their graduation). The main reasons which caused the changes in the differential of gender wages are the shift of men into higher-earning positions, industries, and firms. Married workers and employees in certain sectors have a greater wage increase. Workers with a high school education have fewer changes in the gender wage gap over their lifecycle but with the same trends as the workers with higher education.

In recent years, the studies in this field in developed countries have focused on some non-classical and irrational reasons. Wiseman and Dutta (2016) investigate the relationship between religion and the gender wage gap in the United States in 2007 and 2014. The results indicate that religion is one of the determinant factors of the differential of gender wage, and it positively relates to the gender wage gap. The workers with strong religious beliefs and participation (e.g. an expressed belief in God or the need to pray) have a larger gender wage gap.

3.2.2 European countries

From 1995 to 2002, the real wage increased for nine European Union countries, the cause of which being mainly the improving return of characteristics of the labour force instead of the change in structural composition. Developments in the economy positively pushed the increase in wages. Individual income at the two ends of the entire wage distribution was impacted more by the improvement of the economy. Meanwhile, the increase in the scale of migration lowered the wage level (Christopoulou et al., 2010).

The gender wage gap in the European Union has been apparent as well as stable at a relatively high level for decades. In 2014, the difference in average wages between men and women ranged from 14% to 16% across the countries. The lowest gender wage gap was in

Romania with 6.1%, and the highest gender wage gap was in Estonia with 23.51% (Boll and Lagemann, 2018). In 2017, the average hourly wage of women in the European Union was lower than men by 16%-17% (European Union., 2018; Foubert, 2018). Across the European Union, the heterogeneity of equality in gender wage in every member country is observed. Workers in Romania still have the lowest level of the gender wage gap with 3.5%, and workers in Estonia had the greatest difference in gender wage with 25.6%. The overall gender wage gap across the countries does not change too much in the European Union. In 2018, women had lower gross hourly earnings on average by 14.8 % than men. Estonia had the highest gender pay gap (22.7 %) and Romania had the lowest (3.0 %) in the European Union (European Union, 2019).

The explanatory factors account for 33.7% of the difference in wages between men and women in the European Union (Boll and Lagemann, 2018). Characteristics contributing to the differences in wages between men and women are mainly the observed education level and the temporary contract mainly (European Union., 2018). In 2017, two-thirds of the differential of the gender wage gap in the European Union was unexplained by the characteristics of male and female workers. The unexplained part of the gender wage in the European Union consists of the consequences of the "career break" after the childbirth for women and the lack of wage transparency in some countries. Other reason for the inequality in gender wage is the sectoral segmentation in the labour market. Men and women dominate in some different fields respectively. The factor of globalisation has had some effects on the individual wage expected from the low-wage worker (Christopoulou et al., 2010).

Redmond and McGuiness (2019) indicate that the gender wage gap has declined across Europe over time. One reason is the gender convergence of human capital such as the education of workers in Europe. The men and women with higher wages have similar characteristics. Full-time male employees have a 13% higher-paid wage than females in Europe. The biggest gender wage differential is unexplained in the East European countries. Job preferences such as the distance between home and workplace, etc. show an important role in the gender wage gap instead of the traditional factors of human capital such as age and tenure. They believed that family-friendly policies are necessary for the European labour market.

The difference in wage between men and women is partly caused by the differentials of

the average characteristics caused by the “sectoral gender segregation” and “occupation gender segregation”. Men and women have different employment distributions and tend to be concentrated in certain production sectors. The sectors treat men and women differently in regards to the various salaries paid or opportunities to be promoted to a higher position (Leythenne and Romkowski, 2018). Blau and Kahn (2016) have similar results, with the consequences caused by different human capitals between men and women for the gender wage gap showing less importance in the labour market of the United States. Women are less employed in the higher or well-paid positions; therefore, the difference in compensation led to the gender wage gap. Moreover, Drahokoupil and Piasna (2017) indicate that the wage gap increases when controlling the work and workplace characteristics in most low-income European countries. It does not support the theory of wage determination based on the individual productivity theory.

Bruns (2019) uses the microdata for West Germany to prove that the unions negatively impacted the equality of the gender wage gap in the 1990s and 2000s. The wage premiums are more beneficial to male employees. Women make slower progress in accessing high-wage jobs due to reasons such as childbirth in their life cycle.

A study by Murillo Huertas et al. (2016) indicates that the situations of the gender wage gap in different regions in Spain varied between 2002 to 2010. Both discrimination and observed factors contribute to the gender wage gap. For the regional difference in the wage gap, the different social and economic features between regions affecting the local women's work-life are important for the variation of the gender wage gap.

Evidence from Switzerland shows that the wage gap between male and female workers with similar capabilities of human capital is an important phenomenon in recent years (Schmid, 2016). The occupational factor dominates the wage difference between men and women due to male workers dominating the high-wage position in Switzerland, and there are different preferences for jobs between men and women. The younger generation has less of a gender wage gap on average. Schmid (2016) found that educational attainment has more positive effects on the wages of men than women, since women have a time of the career-break in the first stage of their work.

Wahlberg (2008) points out that the wage differentials between local natives and refugees

change over time in Sweden. The wage gap between natives and non-refugee immigrants decreases across the distribution, while those between natives and refugee immigrants increase. He studies the wage distribution of workers and finds out that native-born women and non-refugee women are affected by the "Glass Ceiling Effect" in the Swedish labour market. However, a study released by Agiomirgianakis et al. (2018) indicates that there is no strong evidence for either a "glass ceiling effect" or a "sticky floor effect"[13] in the labour market of Greece in 2013. Furthermore, the empirical result proves that the gender wage gap was 10% and half of the wage differential between men and women can be explained with the increase in women's human capital and more emigration of skilled workers out of Greece. These results show an uncertainty in measuring the degree of gender discrimination in the labour market after the economic crisis.

Balcar et al. (2012) used a questionnaire and found that the women earned about 77% of the wage of men in the Czech Republic. Hedija and Musil (2012) tested the gender wage gap in public sectors in the Czech Republic in 2010. In this study, they found that the gender wage gap in the selected public sector was 20%; over 85% of this wage differential of wage between men and women could be explained by the observed variables such as age, education, etc., in this study while the department discrimination was not significant. One important cause of the gender wage gap is overtime work of male employees in the Czech Republic, which accounts for one-third of the difference in wage by gender, just as the consequences of male wages are caused by their advantage in educational attainment. Machová and Filipová (2013) found that there are statistically significant differences between wage determinants of men and women in the Czech Republic, with the family role playing an important role. By controlling the family role, the share of the unexplained part of the gender wage gap in their research declined. Balcar and Gottvald (2016) focused on the crisis period between 2008 to 2014 and stated that wage returns to schooling decreased in the Czech Republic, while the returns to white-collar occupations increased.

Piazzalunga (2018) investigated the wage gap between male and female college graduates

[13] The "sticky floor effect" refers to the scenario when the gender wage gaps widen at the bottom of the wage distribution. The "glass ceiling effect" refers to the situation where gender wage gaps are typically wider at the top of the wage distribution (Kee, 2006).

in Italy. The results show that although women had a higher proportion of workers with a college degree, female wages were less than male wages by 5.6% on average in 2011. The factor of the study field in the college contributes to the gender wage gap. In Italy, female graduates with study experiences in social fields such as law and economics have a greater gender gap of wages compared with those who study in scientific fields such as maths and chemistry in Italy. This result is a meaningful supplement to empirical research. The differential of the field of study between men and women in the university has a strong effect on their wage gap when entering the labour market. A study finished by Behr and Theune (2018) in Germany indicates that the gender wage gap in average hourly starting wages was 20% based on the data in 2001. In 2001, new male college graduates had an average hourly wage of EUR14.20 and female workers had an average hourly wage of EUR11.21 in 2011. This is a large differential for new graduates since these candidates are almost homogeneous to human capital.

The studies on certain developing countries show some various findings. In Poland, the income inequality of one-person households increases with the rising quantile point of the wage distributions. The results show that the unexplained part of the gender wage gap in Poland declines when increasing the quantiles of the wage distribution (Landmesser, 2016).

3.2.3 Others

A study from Kee (2006) with the method of quantile regression found out that there was a strong “Glass ceiling effect” in the private sector in the Australian labour market. The gender wage gap increases across the distribution of wages. Mahuteau et al. (2017) state similar results. The employees in the public sector earn a higher average hourly wage by 5.1% than employees in the private sector. In addition, women's public wage premiums (5.5%) are slightly higher than men’s (4.6%) in Australia. Results from quantile regression show that at the bottom of the wage distribution, the wages of public sector workers are more favourably influenced by the sector. In addition, gender differences are evident across the wage distribution; for example, men have a higher wage premium at the lowest end of the wage distribution while women have this at the top point.

Pérez and Lugo (2017) indicated that the gender wage gap has declined since the previous decades in Mexico, although it is still significant. Wage discrimination is higher for women with relatively low income, and the “Glass Ceiling Effect” has been proven in the wage

distribution by gender. The authors also stated that trade liberalisation does not help to improve the gender wage gap in Mexico.

Kollamparambil and Razak (2016) found that women's salaries in South Africa were 16.42% lower than men in 2001 and 17.95% in 2007, respectively. Over the years, the gender wage gap among African workers has been wide. The racial factor is an important component of South Africa's wage gap. White, coloured and Indian workers had 90%, 50%, and 20% higher wages, respectively, than African workers on average between 2001 to 2007. White women and Indian women experienced more discrimination in the labour market. However, the gender wage gap of the African workers is narrowing.

In 2020, the WEF released a new report which indicated that the differences in educational attainment between men and women are relatively small on average while some countries still lack sufficient investment in female talent. One fact is that women face barriers preventing access to senior positions or work sectors of the economy which provide high rewards. Women occupy 36% of the management positions in senior sectors and official positions in public sectors worldwide (WEF, 2020). Globally, 18.2% of the numbers of corporate boards or top business leaders are women. On average, females account for 22.3% of board members in OECD[14] countries. In emerging countries, this figure is lower; for example, 9.7% in China and 13.8% in India.

3.3 Empirical research in Asian countries

In East Asia, Japan and South Korea have a greater gender wage gap than China, with discrimination being the main component of the gender wage gap (98% for Japan, 94% for South Korea, and 65% for China) in 2017 (Ishizuka, 2018). The continuous tenure of workers is the most important contributor to the gender wage gap in Japan and South Korea. He points out that the increase in labour participation of women workers in Japan (as an aged society) would benefit its economy without damaging men’s work. Women in China need more opportunities to be in management positions to reduce the gender wage gap.

The gender wage gap in the South Korean labour market has continued to be stable since 2001, with gender discrimination increasing since 2008, especially with women over 40 years

[14] OECD refers to the Organisation for Economic Cooperation and Development

old. In South Korea, the gender wage gap was 36.6% in 2014, while the average level of the gender wage gap in OECD countries was 14.3%. The share of the female population in low-wage jobs such as the service industry is greater than males. Women and men in South Korea have a different attitude toward work. Women could accept a part-time job or be a worker with career interruptions, while most men are employed as full-time staff with continuous tenure (Kim and Cho, 2017).

The increasing degree of globalisation increases the difference in incomes between workers and causes more inequality in earning distribution in Asia (Park, 2017). India has experienced rapid economic development since the 1980s and an increase in inequality of wages. Results based on the quantile regression show that many variables that affect the individual wage had changed between 1982 to 2004. In India, the real wage increases most at the higher quantile of wage distribution.

Azam (2012) points out that higher education has a positive contribution to workers' wages and the increase in real wages in India is mainly due to the increase in labour prices. Khan (2017) analysed the migrant workers in the Indian urban labour market. He discovered that urban migrants have higher wages than rural migrant workers and non-migrant workers in urban areas. Educational attainment shows an important contribution to the wages of urban migrant workers, particularly in regular wage work. However, for the rural migrants, the factors of non-human capital, such as the occupation or type of employment, dominate the wage advantage. He believes that education has been found to be a key factor in determining migrants' access to high-paying occupations, but only for urban migrants. Another study from Sharma (2017) also proves that the gender wage gap in India is significant and gender discrimination is greater for low-income women than others. Further results state the discrimination components vary for different occupational workers. Moreover, caste bias is clear in the Indian labour market. The discrimination in wages in urban areas is greater than that in rural areas due to the occupational diversification in India.

The inequality of education has negative impacts on equality in workers' income distribution in Asia. Education attainment significantly affects the earnings of the worker, with higher-level education positively contributing to improving the income of persons who are 15 years old and over (Park, 2017). Evidence from the developing countries states that education

impacts on income distribution in different ways (Fields, 1980). From the view of the world, the improvement of education of the population throughout the entire planet's population contributes to the equality in income distribution. Education has a complex relationship with individual income and has direct or indirect connections with economic development (Tilak, 1989).

Turning to other countries, from 1993 to 2018, with the rapid development of Vietnam's economy, the increase in income and the improvement of income inequality were significant. The differential of gender wage is caused by discrimination in the labour market. Low-wage female workers experience more discrimination in wages than the high-wage female workers in Vietnam (Le and Nguyen, 2018). In Iran, women had less quantity and quality of human capital than men between 2002 to 2005, although the improvement of female educational attainment was significant over the years. Women also have less labour participation and higher unemployment rate due to occupation and employment discrimination in Iran. However, highly educated women experience less discrimination than those young workers who are in big cities with less skill and low pay (Razavi and Habibi, 2014).

A new study from Ismail et al. (2017) states that the gender wage gap in the Malaysian labour market is the consequence of the inequality of wages within the occupation, while the labour participation of female workers has increased. The wage discrimination within occupations is obvious and plays an important role in social welfare equality in Malaysia.

3.4 Empirical studies in China

China has experienced rapid economic development with its abundant and cheap labour in the past decades. The fast development of China is based on its "unlimited supply of labour" with its economic opening and reform (Cai and Wang, 1999; Cai, 2010). One-fourth part of Chinese economic growth was driven by this demographic factor throughout the 1980s into the1990s (Cai and Wang, 2004).

After its reform, Chinese workers' income and income inequality increased rapidly. The relationship between labour supply and labour demand directly affects worker's wages. The wages of unskilled workers have risen rapidly in the Chinese labour market with the acceleration of the aging population in China. Institutional constraints have hindered labour mobility and that pushes up the wages of urban workers simultaneously (Cai, 2010; Athukorala

and Zheng, 2017). The structural changes in the Chinese labour market mainly affected the low-wage workers from 1988 to 2002. The average wage at the 90% quantile of the wage distribution in society was three times the average wage at the 10% quantile point in 1988. This ratio increased to six times more rapidly in 2002 (Yao and Li, 2007). Wage inequality in the Chinese labour market is affected by the changes in human capital and the market price to the specific characteristics of workers. Changes in the inequality of worker wages are determined by the market price to the characteristics of human capital. Over the period from 1988 to 2005, these visible factors' impacts on the difference in gender wage changed in China (Chen and Duan, 2009). Factors such as the economic transformation, the local regulation, the educational level, the reform of the company's ownership and the capital investment, affect the wage gap between the various areas (Zhang et al., 2006). The following sections summarize past research based on different perspectives.

3.4.1 Labour supply side

3.4.1.1 Gender

With the process of becoming a market-oriented economy, the wage differential between men and women has risen in the Chinese labour market. The previous studies were different in regards to methodology, sample, and variables, etc., but the gender wage gap in the Chinese labour market is significant and is proven.

The difference in gender wage was 20.4% in 1989, rising to 30% in 2009. By controlling the variables of human capital, occupation, and geographic location, the overall gender gap was 10.7% in 1989 and was 22.2% in 2009 (Chen, 2011). Yue (2004) states that the gender wage gap was 13.8% in 1991 and it was 22.7% in 2000. In 1997, the differential of wages between men and women was significant, and the female workers had lower wages than males by 33% in the small collective sector (Xing, 2005). Male workers have higher wages than females by 20% in recent years (Li and Xie, 2017).

Gustafsson and Li (2000) use data from the Urban Household Income Surveys conducted in 1989 and 1996 to investigate the changes in the differential wages between men and women in the 1980s after the Chinese economic reform. The results state that the gender wage gap in the Chinese labour market increased in the 1990s, but the level of difference in gender wages was small from an international perspective. The younger generation and the women who are

less educated have a wage disadvantage in the labour market.

The gender wage gap in the urban area rose gradually from 1995 to 2007 in China. The differential of wages between men and women increased between 1995 to 2007 and ranged from 19% to 25% in 2013 (Song et al., 2017). Similar research from Chen (2011) states that the difference in gender wage of the urban workers increased by 10% over the period from 1989 to 2009. The Survey of urban residents in the Chinese Household Income Project in 2003 and 2009 shows that women's wages are much lower than men's (Ding et al., 2012). For rural-urban migrants in China, in 2002, women earned about 70% of the wages of men (Magnani and Zhu, 2012).

The differences in wages between men and women were considerable between 1985 and 1995 in Chinese rural areas, with women earning lower wages than men (Rozelle et al., 2002). Considering rural-urban migrants, females have lower wages than males. The study released by Zhang (2013) shows that female rural-urban migrants have a lower monthly wage by over 20% than males in Guangdong in 2010, although the 75% part of the wage differential was not explainable.

Recently, the research content of labour economics has shifted from the study of average wages to the study of the wage distribution; that is, the differences in wages between men and women are different across the overall distribution of wages (Ge and Zeng, 2011). In 2002, the gender wage gap of migrating workers was largest at the top end of wage distribution. With the method of quantile regression, Wang (2010) studies the difference in gender wage for the migrating workers based on microdata from five Chinese cities in 2006. The effects of explanatory variables of individual wage changed, as did the wage differentials between men and women with the quantile point of the wage distribution. The gender age gap increases when moving to the top end of the wage distribution. Ge and Zeng (2011) point out that the gender wage gaps are different across the whole wage distribution of urban workers in China. At the top of the wage distribution, the difference in wages between men and women is wider due to more gender discrimination.

In fact, the average level of the human capital of female workers is less than that of males, especially for the migrant groups. The disadvantage in human capital restricts access to high-income positions for female workers in the labour market. Marital status and family

significantly impact on employment opportunities. Under the influence of Chinese traditional culture, women need to take care of their children and the family. Female migrants must spend more time on the housework during the process of mobility specifically (Song, 2010).

In China, the fact is that women must spend 44.6% of their working time on work without payment such as, home care, an activity on which men spend just 18.9% of their working time. According to another report released by the WEF, in China, women's wage was 64.3% of that of men on average in 2018.

The discrimination against women in the rural sector remained stable between 1985 and 1995 (Rozelle et al., 2002). Based on the data from the Chinese Family Panel Studies (CFPS, hereafter)2009, Su and Heshmati (2015) state that discrimination in the urban labour market was significant. However, the 85% of this wage difference in gender wage was unexplainable. The factor of educational attainment negatively relates to the wage differentials between males and females. Female workers face more discrimination in wages with an increase in their education level. The potential explanation is that the percentages of highly educated women who work in the professional fields or have the senior-level of employment positions are much higher than that of men. Usually, male labour dominates the senior and professional work. Women need more education background than men to win work opportunities. However, as the wage gap between men and women expands, the discrimination part decreases (Qian and Jiang, 2011). In 2013, the biggest part of the gender wage gap of urban residents could not be explained by the employment and individual characteristics (Song et al., 2017).

Many reasons could affect the difference in gender wage. The differential of characteristics of human capital can explain about 80% of all workers' wage gaps between the state sector and the non-state sector (Zhang and Xue, 2008). The transformation of the economy created different wages paid in different sectors and areas. Lots of small state-owned enterprises bankrupted in the mid-1990s. This resulted in the movement of the labourers from the state-owned enterprise to the private business. The processing of economic privatisation increases the difference in gender wage due to more and more women being employed by the private enterprise. The private sectors have more gender differences in wages than the public sectors and increases the degree of discrimination in the labour market. The proportion of the unexplained wage gap has increased from 80.2% to 90.8% from 1989 to 2009 due to the

increase in the scale of the labour force working in the private sector within that same time (Chen, 2011). Sectoral factors determine the worker wage, causing a difference in the wage of workers (Song et al., 2017). Peng (2011) states that the gender wage gap is mainly caused by the inter-sectoral factor in the labour market in China. From 1985 to 1995, the gender wage gap increased in stated-owned enterprises significantly and the increasing discrimination against women in the labour market "offset" the part of the wage gap between men and women, something which was partially suppressed by the system (Demurger et al., 2007).

The new regulation, *The Labour Contract Law*, was implemented in China in 2007.The strict enforcement of this law allows the workers who have employment protection or suffer poor working conditions to require better payment and work environments. It improves the equality of workers' income in the labour market (Cai et al., 2009). Another labour market policy, *the Minimum Wage Policy* enforced in 2004, reduced the difference in wages of low-income workers (Ma et al., 2012).

Other studies state the different findings. Competitions between the companies help to reduce discrimination in the labour market (Demurger et al., 2007). The internal difference in wages between the workers with non-stable work increases. Certain kinds of informal employment, such as the self-business owner, require more work experience and some monetary investment in a job which leads to extra monetary return (Yan,2006). A stable job reduced the wage gap between men and women by 10% in 2002 (Liu, 2008).

Zhao et al. (2019) empirically assessed the long-term trend of gender wage discrimination in the Chinese urban labour market with CHIP data and stated that the observed variables had less and less of an impact on the gender wage gap between 1995 and 2013, while the explained part of the results of wage decomposition results dropped from 74% to 8%. They believe that the gender wage gap and discrimination against women are converging. However, their study does not include the rural-urban migrants, who are an important component in the Chinese labour market.

3.4.1.2 Age, marital status and *Hukou*

Age relates to the working experience of workers closely. The productivity of individual workers will increase with age (Mincer, 1974). However, the younger generation in China has more capability to learn new techniques and skills than their parents (Cai and Wang, 1999). In

2001, the age of the rural-urban migrants showed impacts on their employment in the non-public sector and in the public sector. The age of urban residents affects the opportunity for them to work in the public sector in the Chinese labour market. With the shortage of supply of labour force in 2020, age was not a significant advantage for either migrants or urban residents with regards to employment (Sun, 2017).

Usually, married workers are older and have more experience than single workers. Married workers have more motivation to get higher wages since the living cost of married workers would be higher compared with single workers. The data from the CFPS show that the married worker earned a higher wage than the single worker or divorced workers by 4% in 2009. However, to have children in the family sometimes negatively impacts on the worker's wage. First, the traditional Confucian thoughts would constrain the employment of women who married in the rural sector in China (Rozelle et al, 2002). Secondly, parents must spend time and energy to raise their children and complete home care. Su and Heshmati (2015) state that the workers who have children earned fewer wages by 6% than others who do not have children in 2009.

Since the late 1950s, China has created a segregated labour market by its household registration system (*Hukou*) for rural and urban residents. Every level of the Chinese government strictly controls the migration of people from rural areas to the urban areas and made the plan to manage individual workers in the city. Under this system, the individual worker's social welfare and the opportunities to be employed in a specific sector or area were closely tied with the personal *Hukou.* In fact, in the Chinese labour market, the main barrier to be employed in the formal sectors is the requirement of the urban *"Hukou"* for rural residents. The characteristics of human capital, such as the individual's education, do not have enough of an impact on being employed for rural workers in the city. It is difficult for the migrant to enter the first sub-labour market due to the labour market policy and other related restrictions. Migrants are the main component of the second sub-labour market. The labour inflow mechanisms of these sub-labour markets are different.

In the Chinese labour market, urban residents receive higher pay than rural-urban migrants in the city. Chen et al. (2017) selected the samples from the CHIP 2007 and analysed the difference in wages between the rural-urban migrants who worked in the city with the rural

Hukou and the rural-urban migrants who had the urban *Hukou* after their movement into the city. The urban *Hukou* has increased the hourly income of workers by 43%. Also, the urban *Hukou* affected the wages of employees in private enterprises positively and significantly, increasing the wages on average by 32% as well. Workers who are employed in the labour market through a labour agency with the urban *Hukou* have higher wages on average than those with the rural *Hukou* by 24%. Ramirez and Moon (2018) used the data of CHNS (1993 to 2011) and found that the wage premium of the urban *Hukou* is 6% to 8% with limited importance.

Residents with the urban *Hukou* have more opportunities to participate in non-agricultural employment than residents without the urban *Hukou* (Wei, 2004). The urban *Hukou* constrains access to certain jobs for rural-urban migrants in the urban areas. Inequality in wages and employment opportunities has a negative impact on the mobility of the rural labour force. The rural-urban migrants who move to the city are unlikely to become permanent residents (Chen and Hamori, 2010). Income between those two groups shows a huge difference. To obtain the urban *Hukou* positively affects the mobility of rural workers to the city. Xing (2010) used the microdata of the CHIP 2002 to prove that rural residents are not homogenous. There are significant differences in the decisions of employment mobility between the migrant workers who have successfully obtained the urban *Hukou* and the migrant workers who have not successfully obtained the urban *Hukou*.

After 1978, the personal *Hukou* did not influence individual employment as strongly as before due to the deregulation of labour mobility. Although *Hukou* still affects the personal welfare and employment opportunities in big cities, the importance of this factor in the Chinese labour market has been greatly reduced in 2008 in comparison with before (Weng, 2016).

A dual-labour market in Chinese urban areas is significant. The employment distributions of migrating workers and urban residents are different. The segmentation of the labour market in developing countries is ubiquitous, but it is not discriminatory in the labour market (Herd et al, 2011). Some research focuses on the difference in wage between the migrant group and urban residents. Local natives earn a higher wage than the migrants by 25% (Yan, 2006). The higher wages for urban residents is partly due to the different working capabilities between migrant and urban residents. Urban residents have more education and job training than migrants. In the dual-labour market, there are barriers for the migrant to enter the first sub-

labour market or to be formally employed which provides better wages to the employee. The urban residents also have much more advantage in the information, and the social network, etc. (Zhang et al., 2016). This phenomenon is obvious in the Chinese urban labour market. The difference in work experience and education are the most important factors to cause the wage gap between migrant and urban residents. The differential in characteristics of individual human capital explains 64% of all difference in the wage gap between migrant and urban residents in 2002. Wage discrimination for migrant workers in the urban labour market is significant. In 2007, this explained part was 76% of the wage gap between those groups (Pang and Chen, 2013).

Zhang et al. (2016) used the data of CHIP 2007 to prove the wage differentials between urban and rural-urban migrant workers in China. The empirical results for wages of workers in the Chinese labour market show that the discrimination against migrants is significant and that the average wage of migrants is 49% of the wage of urban locals. Their study indicated that differences in educational attainment, work experience and other observed factors can explain 80% of wage differentials between those groups. It proves that workers with the rural *Hukou* and workers with the urban *Hukou* are heterogeneous in the Chinese labour market.

Similar results with the quantile regression method from Zhu (2016) based on data from CHIP 2002 and CHIP 2007 indicate that the mean wage gap between rural-urban migrants and urban workers has risen from 48.0% in 2002 to 58.4% in 2007. The highest differential of wages between the two groups is at the top end of the wage distributions of workers. The differences in productivity characteristics between them have caused the main part of wage differentials and demonstrate that discrimination against rural-urban migrants is obvious.

3.4.1.3 Human capital

G. Fields (1980) stated that *"the social gain from education is taken as the difference in income between individuals with and without the education level".* With the process of the Chinese economy's privatisation, the factors of the human capital contribute to workers' wages in the labour market. In 2004, the educational attainment return rate was 10.9% for the Chinese urban workers (Liu, 2008). Sun (2017) found that wages in the public sector have been gradually determined by the market forces and economic factors since 2001, like that of the private sector.

Before 1978, the government indiscriminately managed the employment of graduates from junior college and college in China. Female and male workers were equal in the employment opportunity and there was no significant difference in wages between men and women. Wages were determined more by government regulations than by individual factors of human capital (Wang, 2005).

Lots of studies focus on the contribution of education on worker income in the Chinese labour market. Payment of workers increases with longer and better education (Gustafsson and Li, 2000; Liu,2008; He and Wu, 2014; Park and Qu, 2013; Yang and Wang, 2015). Empirical studies on the Chinese labour market show that the marginal return of education has increased since the 1990s and the higher education level improves the income significantly. In the early 1990s, the return rate of extra education annually on wages was 2% and it was less than the contribution of personal experience on wages. Yue (2004) states that the educational return on income rose significantly over the period from 1991 to 2000 through his study on data of the Chinese Urban Household Survey. The estimates of the educational effect on wages increased from 2.7% in 1991 to 8.2% in 2000. The educational attainment leads to higher wages by 5% for each upgrade in the education category (Su and Heshmati, 2015).

Employees with higher education have more benefits from their schooling experience. Higher education increases the opportunity of transferring employment to a different industry (Yue, 2004). Extra education by one year increases the opportunity of employment in the formal sector for an employee by over 1% (Yan, 2006). The higher educational level leads to a higher marginal return of education on work income. Secondary education has more significance in reducing inequality in income distribution (Park, 2017; Tilak, 1989). In the long run, the expansion of the scale of Chinese university education has not reduced the return of higher education (the junior college schooling and above). On the contrary, the return on higher education has increased (Wang, 2005; Park and Qu, 2013; Yao et al, 2013; Yang and Wang, 2015; Fang and Huang, 2017). For example, from 1998 to 2009, the return of high education to wage had increased from 3.6% to 7.0% when controlling the employment relevant variables such as occupation, sector, and ownership of the business. Moreover, the proportion of workers with high education positively related to the employment rate of highly educated workers and between 1998 and 2009 (Yao et al, 2013).

The returns of education on wages are different between the population groups such as the employment sector and gender, etc. Women have a higher educational return on wages than men (Liu, 2008; Yang and Wang, 2015). Education contributed more to workers with high personal income and employees with higher education between 2002 and 2009 (Ding et al., 2012). Education also contributed more to the high-wage female worker's income, although women had lower overall wages than men (Peng, 2011). Education had more impact on urban residents' wages than migrants' wages (Xie, 2007). Considering migrant workers, the education of low-wage workers had a greater impact on wages over the period from 2001 to 2010 (Cai and Du, 2011).

Education positively affects the growth of individual wages. For companies with different ownership characteristics, the impact of education investment on wages is different. Over the period from 1989 to 1997, the state-owned sector, the collective-owned sector and the private-owned sector had different the marginal returns of one-year education on workers' wages (Xing, 2005). Similarly, the contribution of education investment on personal income in the formal sector was different from the return in the informal sector in six large Chinese cities in 2010 (Park and Qu, 2013).The annual schooling increased the workers' wages by 4.1% in the private-owned sector on average. Employees working in formal employment have much more educational benefit to their income compared with workers who have the same level of education and are working in informal employment. Education pushed the migration of workers from the rural area to the urban area in China (Xing, 2010). However., the return of education on individual wages decreased significantly when controlling job factors such as the scale of the enterprise and level of the privatisation of the company's property (Li and Dong, 2008).

Xu (2010) employs the general equilibrium model to prove that return to education is the main source of rising income inequality in China. From 2001 to 2010, the return of education on migrant's income increased significantly. Education increases the opportunity to enter the public sector for migrants. One possible reason is that the decrease in the labour supply caused an increase in wages after 2004. More specifically, the shortage of low-education labour causes the wage of that worker to increase rapidly. The increase in rural-urban migrants' wages repaired the distorted return rate of education on personal wages in the last years in the urban labour market (Sun, 2017).

The characteristics of human capital have different impacts on reducing the wage gap between men and women in China. Education helps to improve wage differentials between the specific groups. Higher education will increase the opportunity for personal employment (Chi and Li, 2014). Education reduces gender inequality in the process of urban China's economic transition (He and Wu, 2014). Education also shows more positive effects on wage equality for women and individual educational attainment of workers inversely related to the degree of gender discrimination in wages (Liu, 2008). The level of personal education negatively relates to the degree of wage discrimination against women in the Chinese labour market. Data from China's Urban Household Surveys from 1988 to 2009 shows that education helps to improve the inequality of gender payment. The increases in the scale of female graduates have changed the lack of skilled female labour. The shortage of highly educated female workers, however, is real. The scarcity of female professional employees decreases gender wage discrimination in the Chinese labour market (Chi and Li. 2014). The wage differential between women with higher education and women with lower education is greater than that of men. The female workers who were educated only at the elementary level face more discrimination in wages (He and Wu, 2014). Education improves the inequality in wages between the state-owned sector and the non-state-owned sector (Zhang and Xue, 2008). Higher education narrows the wage differentials between the different employment groups. With the improvement of education of labour in China, the wage gap between unskilled workers and skilled workers gets narrowed (Cai and Du, 2011). Workers with higher education have more advantages of wages due to the opening of the economy and increasing international trade in China (Zhao and Li, 2014).

Quantile decomposition provides a method to examine the impact of variables on the outcome at each point in the entire distribution. A study on the labour market in seven Chinese coastal cities from Qian and Jiang (2011) shows that the rate of educational return on personal wage rose with the increase of quantiles in the entire wage distribution in 2006. The high-wage migrants have higher marginal education returns than the average level of migrants.

However, in the Chinese labour market, educational attainment does not dominate the rate of wages of the worker. Other factors, such as the industry of employment, the region of work and so on, play the important roles. From 1990 to 2000, the return rate of education on wages in the Chinese labour market had increased, while working experience had more effects on

migrants' wages than the impact of education in 2000 (Xie, 2007). After 2000, educational return to wages shows a stable and even decreasing trend if considering other factors. The contribution of education on wages is significantly affected by the categories of individual workers and other personal characteristics (Ding et al, 2012). For example, working in the state-owned sector negatively affected the education return to worker wages in the 1990s (Xing, 2005).

"*The growth of earnings with experience, it is a much more powerful determinant of earnings than age"* (Mincer, 1974). Work experience affects the personal wage differently in two stages. In the early days of personal work, accumulated work experience had a positive contribution to workers' wages. However, after a certain amount of personal work time, the increase in personal work experience will reduce personal wages. It shows a negative correlation between individual working experience and personal wage in the second stage.

Work experience increases with the growth of individual age. Younger generations may accept new technologies, and the labour productivity of workers will fall after the peak of personal work (Su and Heshmati, 2015). In China, individual work experience has opposite impacts on the wage in the state sector and the non-state sector (Zhang and Xue, 2008). In the state sector, the worker who is employed the earliest gets more pay, with worker wage negatively relating to the work experience in some non-state sectors. It is reasonable because the employee wage in the state sector is usually paid by the "ranking seniority" of the employee in the unit. Older staff have the advantage of age to get a higher rank. In the non-state sector, younger generations have the advantage of personal education. They also have the physical factor, with the healthier body being more able than the older worker in achieving more outcomes, thus leading to more pay.

Based on data from the China Health and Nutrition Survey (CHNS, hereafter) in 1988, 1996, and 2005, Chen and Duan (2009) state that women have different work experience returns to wages at different quantile points of the wage distribution. Using the cross-sectional data of China's Urban Household Survey and the quantile decomposition approach, Yao and Li (2007) state that the changes in the structure of the labour market, such as the changes in the individual education and work experiences, show the positive impact on the improvement of wage inequality. At the top of the wage distribution, the smaller the gender wage gap is due to a

reduction in differences in the personal characteristics of men and women (such as education) (Ge and Zeng, 2011).

3.4.2 Labour demand side

3.4.2.1 Business ownership

The development of the Chinese market is the continuous process of privatisation and the diversification of the enterprise's ownership. The various ownership sectors contribute to economic growth and the increase in citizens' income. Many urban-rural migrants from the western and central provinces to the eastern provinces have ensured the demand for private enterprise workers in China's coastal areas. In 2009, over 70% of all migrants were employed by private or individual enterprises (Rush, 2011). The difference in enterprise ownership causes the differential of worker wage. The wage gap between male workers and female workers increased when the Chinese economy transferred from being centrally controlled to liberalisation.

The data from the CHNS indicates that the wage in the public units (the government and the public institutions) was lower than the wage in the non-public units by 3% over the period from 1989 to 1997 (Yin and Gan, 2009). However, between 2000 and 2006, the average wage of a worker in the public units was significantly higher than the worker wage in the non-public units by 13%. Furthermore, the state sector (the government, the public institutions) and the state-owned enterprises have significant advantages of worker wage compared with the non-state sector. The average staff wage in the state sectors was twice that of the non-state sector according to the survey in three Chinese provinces in 2005. Wage differentials between the state sector and the non-state sector are more pronounced among low-income workers (Zhang and Xue, 2008).

Worker wages in enterprises with different properties have changed differently. The wage in state-owned enterprises or collective-owned enterprises had higher growth than the average level of all enterprises from 2008 to 2010. The difference in wage between the state-owned enterprises and the non-state-owned enterprises is significant in China (Rush, 2011; He and Wu, 2014). In1991, the gender wage gap in the state-owned sector, the small collective sector, the large collective sector, and the private sector was about 6%, 12%, 16%, and 22%, respectively(Xing, 2005). The largest wage gap between men and women is in the group of

employees who are over 40 years old, less educated and work in the non-state-owned sectors (Zhang, 2004).

The difference in wages between the public and the non-public sector is partly due to the different wage-setting mechanisms in these sectors. The non-public sector is a market-oriented market, but employee wage in the public sector is dominated by the government. The liberalisation of the market shows the difference in effects on the wage in various categories by business ownership (Zhang and Xue, 2008). Competition in the labour market has brought more returns to the characteristics of human capital. Competitions between companies have positive effects on the improvement of equality in gender income. The characteristics of human capital such as personal education and work experience contribute more to worker wages in the non-public units (Demurger et al., 2007).

The mechanism of wage determination in the state-owned sectors and the private-owned sectors are different. In the process of market-oriented reform, the characteristics of human capital play more roles in determining wages, and gender discrimination in the labour market diminished with this change (Liu et al., 2000). In the private sector, the wage gap between men and women is the largest, while the gender wage difference between employees in government and public institutions is the smallest. The difference in the gender wage of the public units is smaller than it in the non-public units and wages in the private sector show the greater wage gap between men and women (He and Wu, 2014). When controlling the explanatory variables such as the scale of the enterprise, the level of the privatisation of the company's property and the outside competitive environment, etc., the difference in gender wage becomes smaller (Li and Dong, 2008).

3.4.2.2 Occupation and Industry sector

Employment occupations have different effects on the wage of different groups. Most occupations require different skills and capabilities. The evidence based on the data of CFPS in 2009 shows that white-collar workers have higher wages than low-wage workers by 11.2% in the service industry. Junior employees of professional staff (lawyers, professors, etc.) earn higher wages than a worker in the service industry by 25%. Senior staff (who usually have more experience and skills in current work) have wages 55% higher than the junior workers. The worker who has special skills earns a higher wage by 14.8% (Su and Heshmati, 2015).

Various kinds of compensation for different skills and work abilities may result in wage differences. In the public sector, state-owned enterprises offer a higher wage by 8% than the government (Yin and Gan, 2009). The wage gap between the state sector and the non-state sectors was small for a highly educated employee. Human capital characteristics play a decisive role in wage decisions (Zhang and Xue, 2008). Low-education workers in the state sectors have an advantage in wages due to the segmentation of the labour market (Sun, 2017).

A study on the Hong Kong labour market by Sung et al, in 2001, pointed out some different results. Their study found that the gender wage gap declined from 71% in 1981 to 83% in 1996. The female workers benefit from the occupation diversification and occupational segregation since there are small wage differences between men and women caused by the occupation differences.

Due to its abundant and cheap labour, China's labour-intensive industries have achieved rapid development. Since 2001, the employment structure in the Chinese labour market has changed. In 2001, over 65% of all observed urban residents worked in the public sectors, and over 53% of all migrant labour force was self-employed. In 2010, the share of urban workers in the public units decreased to 49% and the share of migrants who worked in the public sectors was 7%. The proportion of the migrants who were employed in the private sector increased from 34% to 57% over the period from 2001 to 2010 (Sun, 2017).

Wang and Cai (2008) used data from five large cities and stated that the difference in wages between men and women caused by sectoral factors count for about 6% overall. Over 60% of all differences in gender wage in the labour market and over 80% of all gender wage differentials in the specific sector cannot be explained by the human capital and personal characteristics. However, gender discrimination in the specific sector is significant.

Other evidence from the five Chinese cities shows that the wage gap between men and women in China is mainly caused by the inter-sectoral factor, and only a little part of the gap caused by the different industries (Wang, 2005). The result of the decomposition of the wage gap shows that over 80% of all differences in wages between men and women in the same industry cannot be explained by the observed variables. Gender discrimination is significant and investment in human capital does not improve the problem effectively (Chen, 2011). Similar results for Ma (2017) indicate that unexplained factors dominate the gender wage gap

in urban China and the influence of intra-sector differentials shows more impact on the wage gap between men and women in 2013.

From 1985 to 1995, the sector gender wage gap decreased in most sectors with different enterprise ownerships. The low-wage female workers with less advantage of the human capital experience more discrimination (Demurger et al., 2007). The wage gap between high-education workers and low-education workers decreased with the Chinese economic opening process (Zhao and Li, 2014).

Qi and Liu (2009) used quantile regression analysis to investigate the gender wage gap among state sectors and non-state sectors. The results show that there is a "Sticky Floor Effect" rather than a "Glass Ceiling Effect" of the gender wage gap. Discrimination (coefficients effect) dominates the differences in wages between men and women, and the differentials of characteristics of human capital between men and women have little effect. State sectors have a lower discrimination level in wages than non-state sectors.

3.4.2.3 Formal and informal sector employment

Changes in the proportion of enterprises with other ownership cause a change in the employment structure in the labour market. The share of employment-population in the state-owned or collective-owned enterprises of all employment-population fell from 90% in 1990 to 30% in 2010 (Rush, 2011). Workers with a stable employment contract earned a higher wage than those with a non-stable employment contract by 14% in 1995 and by 41% in 2002 (Luo, 2008). At the same time, with the market-oriented reform of state-owned businesses, the proportion of workers who had a permanent contract decreased from 75% to 57.6%.

Park and Qu (2013) state that the proportion of informal sector employment or informal work in 2010 was approximately 20% to 25% of total employment in China's big cities. According to Liang et al. (2016), the share of workers in informal sector employment (the casual workers and the self-business owners) of all employed people in the urban area increased from 35% in 2007 to 57% in 2013 in China. Temporary workers without work contracts are a major component of employment in the informal sector.

The ownership of the enterprises has a significant impact on the wages of workers, especially those who do not have a stable job. The evidence from CHIP in 1995 and 2002 states that the stability of the job positively contributes to worker's income (Luo, 2008). The

difference in wages between workers with a stable job and workers with a non-stable job is more significant for low-income workers. However, informal sector employment shows benefits to vulnerable people who cannot compete in the formal labour market (Cai and Wang, 2004).

Data from China Family Panel Studies (2005) (CFPS, hereafter) in Shanghai, Zhejiang and Fujian province shows that the difference in gender wage was 19% in the formal sector and it was 53% in the informal sector in 2005 (Zhang and Xue, 2008). Chen and Hamori (2010) prove that the differences in the characteristics between formal and informal employment account for the main difference in the wage between those two groups according to data from CHNS in 2004 and 2006. Characteristics relating to the productivity of workers have more impact on the wages of employees in informal employment than in formal employment (Yan,2006). In the formal sectors, which lack the supply flexibility of the labour force, human capitals such as education and work experience contribute more to individual wages, and the discrimination of women is more obvious (Chen and Zhang, 2010). The intensity of rural-urban migrants in the production sectors affects the differential of wages between those sectors.

Human capital's characteristics affect labour mobility from the informal sector to the formal sector as well as the opportunity to be employed in formal sectors. Also, the movement of labour from the informal sector to the formal sector increases worker wages (Cai and Wang, 2004; Yan, 2006).

Considering differential wages relating to personal employment, characteristics of the individual employees could explain one-third of the wage gap between formal employment and informal sector employment in urban China (Zuo, 2013). Female workers in the informal sector face more discrimination in wages in the labour market. The wage gap between the formal sector and the informal sector increases in some Chinese cities. The education of employees in the informal sector has fewer salary returns. However, education contributes much more efficiently to raise wages among workers in the informal sector employment (Park and Qu, 2013; Yan,2006).

Nevertheless, in previous studies, China's definitions of the "informal sector" and "informal sector employment" were different. There are several ways to identify the informal sector employment, such as those based on social security coverage, measures based on self-

employment, and methods based on unregistered employment levels (World Bank, 2007).

3.4.3 Labour market segmentation

In the 1950s, China introduced the household registration system (*Hukou*) for rural and urban residents to manage labour mobility and other social activities. The dual-labour market and the labour market segmentation has existed since the establishment of China. The "dual-labour market" in China is different from the assumption of Lewis's model. The Chinese "dual-labour market" shows the reality of the coexistence of the rural-urban migrants' sub-labour market and the urban residents' sub-labour market in the cities. Urban workers and rural workers have different human capital capabilities.

The first sub-labour market shows the least elasticity of labour supply, with this sub-labour market being dominated by the local natives (the urban residents). In the first sub-labour market (the main labour market) in the city, workers have stable employment (job), training on the job, social protection related to their employment and higher pay for work. For both employers and employees, the first sub-labour market is more stable. The second sub-labour market has the most elasticity of labour supply, and it is a competitive market. In the second sub-labour (the secondary) market, workers have unstable employment, poor working conditions, less employment training and promotion opportunities, and less labour protection. Meanwhile, the migrants who moved from rural China to Chinese cities are employed in different industries and enterprises.

The sub-labour market of rural-urban migrants and the sub-labour market of urban residents in the city have different mechanisms of wage determination respectively. After 2004, with the aging population in China, the second sub-labour market has become more sensitive to the shortage of labour force. The salary of low-wage migrants increases significantly. The wage of migrants showed a similar trend of change with the wage of urban residents after 2001 (Sun, 2017). However, social insurance and employment protection for the migrants is not enough (Cai et al, 2009; Chen, 2011). The evidence from Yan (2006) states that the labour market in Shanghai City, as well as in some other provinces in China, has a strict and obvious segmentation. The components of segregated China's labour market segregation show different and hierarchical structures. Migrants and local natives (urban residents) are employed in different sub-labour markets.

In order to have a job or work in the city, China's rural-urban migrants have to work with the extra costs such as working overtime or less personal employment opportunities, compared with local natives. After 2000, the change in migrants' work has mainly been the transfer within the informal sector. Compared with regular employees in the same industry, migrants usually have temporary contracts and low wages (Yan, 2006; Cai and Wang, 1999).

Economy reform has caused significant changes in the workers' income distribution in China. In the mid-1980s, wages of rural-urban migrants in the city rose rapidly and then later slowed. The average increase in wages paid to migrant workers was lower than that of urban residents (Lu, 2012). Before 2004, the infinite supply of labourers from the countryside ensured a low cost of migrant workers. From 1990 to 2002, the real monthly wage of workers in the production line only increased by CNY 68 (Bao, 2005). Due to the labour market segregation and the barriers for migrants to enter the sub-labour market of urban residents, the increase in the size of migration has had no negative impact on the wage growth of urban residents, and the real wages of migrants have not increased (Chen and Zhang, 2010; Cai and Du, 2011).

Xie (2007) pointed out that rural-urban migrants, which account for 50% of all urban employment, dominated the employment of the non-state sector and enterprises from 1999 to 2000. The differences in the income of migrants and urban residents include wage and monetary social welfare. Monetary social welfare dominates the income gap between the rural-urban migrants and the local natives.

The wage gap between migrants and urban residents is significant. In 2001, the observed native worker had double the average wage compared with the migrant workers in the city. The difference was more obvious for a migrant who worked in the public sector. In 2010, however, the difference in wages between migrants and urban residents narrowed. The private sector provides many fair wages to migrant workers (Sun, 2017). Data from Zhejiang province proves that urban residents had higher wages than migrants by 26% in 2003 (Xie and Yao, 2006). The differential of human capital between the migrant and the urban resident explained 44% of this wage gap. After the signal of the scarcity of migrant labour, the wage gap between the migrant group and urban residents decreased (Cai and Du, 2011).

A study from Wang (2010) shows that the unexplained part of the differential of gender wages was more than 60% for the migrants in five cities of China in 2006. However, 75% of

the difference in wages between male migrants and females cannot be explained by the visible factors in 2002 (Zhang, 2013). For the rural-urban migrants, women spend less time job searching than men on the job searching after their movement from rural areas to the city (Song, 2010). Female migrants also have fewer opportunities to find high-paying jobs. Most female migrants work fewer hours on average per day than men. Women have less professional experience, which leads to discrimination against women in regards to the promotion (Qian and Jiang, 2011).

Zhao (2016) indicated that the difference in the wages of migrants and urban residents is mainly caused by the differential of the visible factors, such as education. Visible factors explain 57% of all wage gaps between men and women. Discrimination against migrants was not a significant problem in 2013. Other research states that discrimination in wages is caused by the different processes in accessing a job. There are many barriers for the migrant to overcome when attempting to seek work in the public institutions as discrimination against migrants is strong. Migrants earn fewer wages than urban residents (Sun, 2017; Rush, 2011). Differentials of wages between the low-income female workers and the high-income female workers are greater than that of males. Low-income women lack the capability to negotiate in the labour market (Liu,2008). The wage gap between the migrant groups with different working skills decreases (Cai and Du, 2011).

The sub-labour market of rural-urban migrants in China is imperfect and less efficient. Lack of employment protection causes a decrease in the willingness of individual migrants to be employed and delays labour mobility. The labour market mismatches for the labour demand side and labour supply side in some industries. A few previous studies have focused on the differences in the gender wage gap between rural-urban migrants and urban residents.

3.4.4 Other factors

Wei (2004) used the data of CHNS in 1993 and found that health significantly affects the Labour Force Participation Rate instead of the worker wage. Using the internet increases the individual wage significantly. Li and Xie (2017) used the data from CHNS and discovered that the internet wage premium is about 18% to 20% when controlling other variables such as education and employment. The access to the internet helps to reduce the difference in wages between the high-wage group and the middle-wage group.

The development of international trade helps to increase wage levels in the Chinese labour market and improves the educational return on workers' wages. From 1995 to 2007, trade openness showed a positive relationship with the wage of the workers who have different education, and the estimated coefficient of education to wage increased significantly with the opening process (Zhao and Li, 2014; Li and Li, 2012).

The development of the regional economy helps to narrow the gender wage gap in the local area (He and Wu, 2014). Wei and Xie (2013) studied the data on labour wages in 2010 to compare the determination of worker wages in the Pearl River Delta and Yangtze River Delta of China. They found out that regional differences in wages in different areas are evident. One reason is that the difference in local capital resources drives the different models of development. This leads to differences in required workers' characteristics. However, the different characteristics of human capital vary in their contribution to the individual wage.

The Minimum Wage Policy regulates the minimum monetary payment for full-time workers. Labour market policies push the increases in the cost of workers and have negative impacts on the number of employed workers (Ma et al., 2012). In 2008, a new "*New Labour Contract Law*" was implemented. This law provides a basic source for the employer and the employee to achieve a harmonious labour relation and improves the inequality in the labour market. This law requires that the employer offers a better fixed contract and more social protection in relation to the work of the employee. However, the Chinese labour market developed and expanded too fast to have the perfect law-based relationship. Employment in the informal sector continues to expand, and workers in these sectors continue to receive less employment protection as well as other unfair treatment. Contents of the law are strict, and the possible punishments are limited (Herd et al., 2011). Additionally, in China, the basic social security system for workers in the informal sector has not been established. The *"Labour Contract Law"* hardly affects the vulnerable group of workers working in the informal sectors or businesses (Liang et al, 2016). China's labour market is an inefficient labour market with insufficient services and protection for workers, and a lack of employment agencies (Cooke, 2011). The effectiveness and efficiency of China's labour market regulations challenge the government.

3.5 Summary of data and methodology used in some representative studies in China

Previous studies use the different wage decomposition methods to identify potential determinants of the wage gap between the various groups. Table 10.1, shown in the Appendix section, reports a summary of some representative studies focusing on the Chinese labour market. One of the contributions of this doctoral dissertation in terms of literature is to study and compare the two parallel labour markets of urban residents and rural-urban migrant workers in China.

CHAPTER 4 DATA AND METHODOLOGY

This section presents the data and methodology used in this doctoral dissertation. Three cross-sectional data used in this doctoral dissertation come from the Chinese Household Income Project 2003, 2008, and 2014, which describes the microdata of the Chinese labour market in 2002, 2007, and 2013. An expanded Mincer Earnings Function is used to test the effects of gender and other explanatory variables on rural-urban migrants' and urban residents' wages. First, the doctoral dissertation employs the Ordinary Least Squares method based on the logarithmic mean of the hourly wage of observations. Second, the Blinder-Oaxaca decomposition (Oaxaca, 1973; Blinder, 1973) is used to present empirical results to analyse the differentials of gender wage. Third, it uses the Quantile Regression method to compare the difference in the gender wage gap across the entire distribution of the wage.

4.1 Data

4.1.1 Chinese Household Income Project

This doctoral dissertation uses microdata from the Chinese Household Income Project (henceforth, CHIP). CHIP aims to "track the dynamics of income distribution" in China. CHIP project has finished five household surveys on the comprehensive information of the household and individual in China in 1989, 1996, 2003, 2008, and 2014, respectively. CHIP covers the income and the expenditure information of individuals and families, and includes other personal information such as the personal status of household members, the personal schedule of working time, the personal employment situation, the household assets, the agricultural work of rural residents, etc. This project was initially organised by the National Bureau of Statistics of China (in and before 2007) and is now jointly organised by the Beijing Normal University, the Australian National University, and the Institute of Labour Economics (after 2007). CHIP collects the original data of the level of social, family, and individual residences systematically. CHIP is the main database of the social studies and related research for the academic institutions and government in China.[15]

[15] The main microdata survey projects related to labour market research in China includes the Chinese Household Income Project (CHIP), the China Health and Nutrition Survey (CHNS), the Chinese Urban Household Survey (CUHS), the China General Social Survey(CGSS) and the China Family Panel Studies (CFPS). Among these survey projects, CFPS was launched in 2010. CGSS, CHIP, CUHS and CHNS provide the data from 2000 to 2015.

CHIP's sampling method is stratified random sampling from the database of the Chinese Urban and Rural Household Annual Survey which covers 160,000 households in all 31 provinces (municipalities and autonomous regions) finished by the National Bureau of Statistics of China every year. CHIP also provides data collected by interviewing households with relative questionnaires.

CHIP tracks the dynamics of Chinese residents' income distribution. Before 2002, CHIP provided surveys of urban households and surveys of rural households. Since 2002, CHIP has added a separate survey of rural-urban migrants to cover all workers[16]. That makes CHIP became the main and authoritative project on the rural-urban migrants since the National Bureau of Statistics of China does not provide statistical information on rural-urban migrant workers. The data from CHIP 2002 includes three sub-samples, which are the urban household survey, the rural household survey, and the rural-urban migrant household survey.

This study uses the subsample of rural-urban migrant households and urban households from CHIP 2002, CHIP 2007 and CHIP 2013[17]. Surveys from CHIP 2002, CHIP 2007 and CHIP 2013 cover the observations in different provinces and provide a comprehensive view of the changes in the Chinese labour market and at the micro-level of society during the labour market's transition in China.

CHIP 2002 was finished by the National Bureau of Statistics of China (NBSC) in 2003. The Household survey questionnaire of CHIP 2002 consists of ten parts, which cover the information relating to personal living conditions, individual and family level income, expenditure for the urban residents, the rural household, and the group of rural-urban migrants. It also includes general information about the urban community and village committee relating to observations. CHIP 2002 covers data in ten provinces and one province-level municipality in China.

CUHS is not a public resource and requires special authorisation. CHNS focuses on the issue of Chinese health and nutrition. CGSS provides data about urban workers in China only. Among these survey projects, only CHIP has provided sub-datasets for rural residents, rural-urban migrants, and urban residents since 2003, respectively. Considering the research objectives of this doctoral dissertation, CHIP is selected to be the data source to examine and compare the relevant issue of urban residents and rural-urban migrants in the Chinese labour market.

[16] The National Bureau of Statistics of China does not register the rural-urban migrants in urban areas.

[17] CHIP 2013 is the newest project, which was implemented in 2014.

CHIP 2007 was organised by NBSC, Beijing Normal University and the Australian National University, with the assistance of the Institute for the Study of Labour in 2008. The CHIP 2007 survey consists of the urban household survey, the rural household survey, and the mobile population survey. CHIP2007 covers eight provinces and one province-level municipality on urban individuals' income, consumption, and employment. The sub-sample of rural-urban migrants covers fifteen cities in China: Shanghai (metropolitan area), Guangzhou city, Shenzhen city and Dongguan city in Guangdong province, Nanjing city and Wuxi city in Jiangsu province, Hangzhou city and Ningbo city in Zhejiang province, Wuhan city in Hubei province, Hefei city and Bengbu city in Anhui province, Zhengzhou city and Luoyang city in Henan province and Chengdu city in Sichuan province. Most of the population of rural-urban migrants is concentrated in the above cities in China.

CHIP 2013 was jointly completed by the China Income Distribution Institute of Beijing Normal University with support from NBSC in 2014. The samples of CHIP 2013 cover households from 234 counties in 126 cities of 15 provinces in China.

4.1.2 Sample and variables based on CHIP 2002, CHIP 2007 and CHIP 2013

This study uses the sub-samples of rural-urban migrants and sub-samples of urban residents of CHIP 2002, CHIP 2007 and CHIP 2013. CHIP data based on the household survey covers all individuals in the observed family, which includes the children, the retired residents, and the employed person, etc. The original size of the sub-sample of urban migrants in CHIP 2002 is 20,632. The sub-sample of the rural-urban migrants in CHIP 2002 contains 5,327 observations. The data of urban individual income, consumption, and employment in CHIP2007 include 14,683 observed urban residents. CHIP 2007 contains 8,446 observed rural-urban migrants. In CHIP 2013, there were 19,887 observations in the survey of urban residents that included data on urban individuals' income, consumption, and employment. The size of the rural-urban migrants' sample in CHIP 2013 is 2,210.

The doctoral study focuses on the workers aged 16 to 60 in the Chinese labour market and selects workers who have positive wages and have responses for all key variables in the survey. The observations younger than 16 or older than 60 in CHIP 2002, CHIP 2007 and CHIP 2013 are dropped. It analyses the determinants and relevant issues of full-time employees' wages and uses the nominal hourly wage to take regression analysis. Therefore, only the full-time

employed workers are selected in this study. The observed individuals in CHIP who are not employed full-time, such as the students, retired persons, etc., are eliminated. It excludes the observations in these surveys that provide the missing or negative value of individual income or wages.

As a result, the total number of selected observations of the rural-urban migrant sample of CHIP 2002 is 3,276, which includes 1,862 men and 1,414 women. There is a total of 9,955 wage workers selected in the urban resident sub-sample, which includes 5,526 male observations and 4,429 females. There are 6,589 selected rural-urban migrants including 4,000 males and 2,757 females from CHIP 2007. The final size of observed urban residents is 6,642, which consists of 3,826 men and 2,816 women. The final sample of rural-urban migrants contains 1,200 observations, which include 714 male migrants and 486 females of CHIP 2013. The number of urban resident workers is 9,326, which contains 5,244 men and 4,082 women.

CHIP provides detailed information about personal income and employment, such as yearly or monthly income, working days per month or week, working hours per week, educational attainment, employment occupation, industry, and enterprise ownership, etc. Additionally, it includes demographic details of individual workers such as age, gender, marital status, and ethnicity, etc.

This doctoral dissertation employs the logarithm of the hourly wage[18] to be a dependent variable. In a standard Mincer Earnings Function, explanatory variables (independent variables) are the variables which directly or indirectly affect the earning of workers. The explanatory variables consist of the factors of demographic characteristics, human capital characteristics and job characteristics. In this study, explanatory variables include the gender, age, regional location, *Hukou* status, ethnic group, marital status, educational attainment (years of education and category level of education), working experiences (include squared working experience), ownership of enterprise, employment sector, occupation, enterprises size, employment contract, and the way of finding the current job.

[18] Nominal hourly wage of worker = the nominal wage or earning per month/ (working days per month × working hours per day). Here, the nominal wage or earning refers to the total income of wages, bonuses, and allowance of a worker gained from the job per month.

All employed variables in the doctoral dissertation stay strictly consistent with that in the original questionnaire of CHIP 2002, CHIP 2007 and CHIP 2013, as shown in Table 4.1.

Table 4.1 Definition of explanatory variables

Dependent variable	**Value description**
Earning of worker	Logarithm of nominal hourly wage
Independent variable	
Demographic characteristics	
Gender	Male =0 / Female =1
Regional location	East / Middle / West China
Age	Age in Years
Nation	Minority=0/ *Han* =1
Hukou	Rural=0 / Urban=1
Marital status	Categorized by the marital status
Human capital characteristics	
Education	Years of educational attainment Categorized by the education level
Experience	Working years (Squared working years)/100
Job characteristics	
Ownership of enterprise	Categorized by the dominating capital
Employment occupation	Categorized by the "Classification of occupations by the National Bureau of Statistics of China" [19]
Employment sector	Categorized by the competitive level
Employment contract	Categorized by the duration of contract
Way of finding the current job	Categorized by the way to find the current work
Firm size	Categorized by the number of employees

Source: Author's elaboration

The personal characteristics of humans are supposed to impact labour productivity and cause a difference in the wage distribution of individuals. These regressors have two different groups: variables related to employees and variables related to the firm. The following part provides more details of the explanatory variables in this study.

Gender is a basic demographic factor. It affects individual wages and causes the

[19] In this doctoral dissertation, in order to stay consistent with the original data from CHIP, the industry sector classification and occupation classification are used the industry and occupation classification standards issued by the National Bureau of Statistics of China, but the international standard industry classification (ISIC) and the International Standard Classification of Occupations (ISCO).

differential of workers' income. In this doctoral dissertation, gender is represented by a dummy variable, which equals zero for men and equals one for women.

Age in years of observed workers is included to be a continuous variable.

"Regional location" refers to the workplace of an observed worker. According to the classification of China Health Statistics Yearbook, the observed provinces and municipalities are divided into three regions in this work: East China, Middle China, and West China in this work.

According to the household registration system of labourers in China, the variable of *"Hukou"* contains the rural *Hukou* and the Urban *Hukou*. Considering the ethnic issue, the *Han* ethnic group accounts for about 90% of the population in China. This work recodes the variable of *"nation"* into *Han* and minority as a dummy variable.

"Marital status" is arranged into three groups: the never-married group, married and other marital statuses (divorced and widowed).

The characteristics of human capital include educational attainment and work experience. *Education level* is an important factor in the human capital model, and it is a measurable ability of individuals which plays a central role in modern labour markets (Mincer, 1958; Card, 1999). In this study, the individual worker's educational attainment is determined by the educational certificate or degree achieved, with years of individual education being calculated continuously by the time of the relevant education degree was obtained.

According to the Chinese education system, education is considered as a categorical variable in this doctoral dissertation. It divides the observed workers into several categories that represent different types of the educational level of workers. Based on the academic degrees of workers, the education level of the Chinese workers includes the following categories: the education of "never been to school or have been to the elementary school" ,[20] the education of "junior middle school ", the education of "specialised secondary school and technical school", the education of "senior middle school", the education of "polytechnic college" (junior college),

[20] The law of nine-year compulsory education in China was implemented in 1986. Some workers who entered the labour market early are without elementary education.

the education of "undergraduate degree" and the education of "postgraduate degree".[21] Figure 4-1 shows the educational system and stages of individuals' schooling in China.

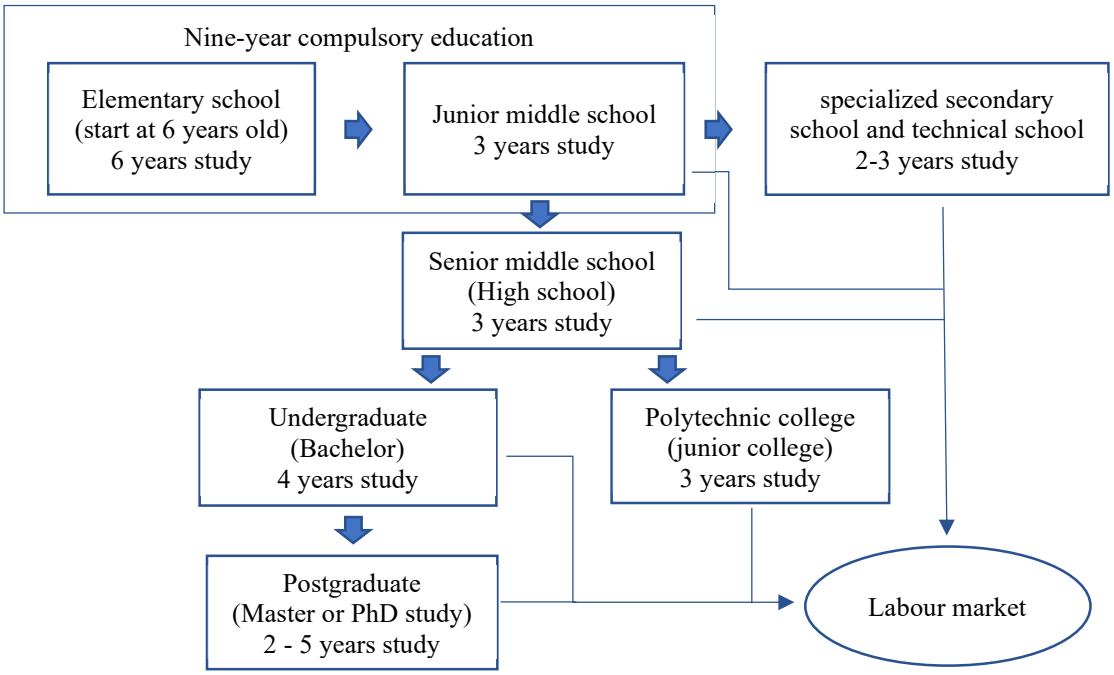

Figure 4-1 Educational system and duration of schooling in China

Source: Author's elaboration

According to the Chinese educational system, in this study, years spent on the education of elementary school is set as 6 years, the time spent on the education of junior middle school is 9 years, the time spent on the education of specialised secondary school and technical school is 11 years, the time spent on the education of senior middle school is 12 years, the time spent on education of junior college is 15 years, the time spent on the education of undergraduate is 16 years and the time spent on the education of postgraduate is 19 years. Lots of previous studies (Xie, 2010; Ding et al., 2012; Deng and Ding, 2012) use the same way to set the category of the education level of workers in China.

The variable of *experience* is a continuous variable. Based on China's education system and labour market reality, the years of working experience of a worker are determined by the age and worker's education (Xie and Hannum, 1996; Yao and Li, 2007; Wang and Cai, 2008; Xie, 2010). It is calculated as shown in equation 4.18.

$$years\ of\ working\ experience = age - 6 - years\ of\ education \quad (4.18)$$

[21] The education of postgraduate degrees in China include the schooling of a master's degree and doctoral degree.

Considering the variables related to the firm, the employment factor is an important determinant of individual wages in the labour market. In this doctoral dissertation, the type of enterprise's ownership is determined by the owners of controlling capital and stays consistent with the results of the survey of CHIP. The doctoral dissertation recodes *the ownership of enterprises* into six categories: the government or public units, state-owned enterprise, collective-owned enterprise, private-owned enterprise and individual business, foreign-owned enterprise, and others.

According to the "Industrial Classification for National Economic Activities" from the Nation Bureau of Statistics of China (1994, 2002), there were sixteen sectors listed in the survey of CHIP 2002 and twenty sectors listed in the surveys of CHIP 2007 and CHIP 2013. In this doctoral dissertation, *the employment sector* of economic activities is categorised into four groups: monopoly sectors, competitive industry, public sectors, other sectors.[22]

According to "Classification of occupations of the people's Republic of China" issued by the Nation Bureau of Statistics of China in 1995, to keep consistent with CHIP, this study recodes *the employment occupation* into six categories: manager or director (including the owner of individual or self- business), technical staff, clerk, service worker, production worker, and others.

The size of an enterprise is determined by the number of employees, it recodes the *firm size* of rural-urban migrants into several groups.[23]

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[22] Following the study of Yue et al. (2011), the monopoly sectors identified in the dissertation identifies include Production and supply of electricity, gas and water; Transport, storage and post industry; Information transmission, Computer services and software Industry; Financial intermediation. Competitive sector industries include Construction enterprise; Wholesale and retail trade; Hotel and catering services. The public sectors contain Public management and social organisation; Scientific research, technical service and geological prospecting; Management of water conservancy, environment and public facilities; Education; Health, social security and social welfare. The other industries are Agriculture, forestry, animal husbandry, fishery; Mining; Manufacturing; Real estate industry; Leasing and business services; Services to households and other services; Culture, sport and entertainment; International organisations and others.

[23] CHIP 2002 does not provide the firm size information for rural-urban residents. For other CHIP related information, see Section 5.2.1.

According to the duration of the work contract, this study recodes *the employment contract* of workers into four categories: permanent contract, long-term contract, temporary or short-term contract, and no contract.

The *way of finding the current job* describes the way for workers found their current work. It is recorded into five categories: by oneself, through a referral by friend or family, assigned by the government or through an open examination, through an employment or commercial agency.

Once again, all employed variables in this doctoral dissertation keep consistent with those in the original questionnaire of CHIP 2002, CHIP 2007 and CHIP 2013.

4.1.3 Statistical description

A summary of the statistics based on hourly wage by gender of rural-urban migrants and urban residents are shown in Table 4.2 and Table 4.3. The difference in hourly wage between full time employed men and women was significant in 2002, 2007 and 2013.

Table 4.2 Average hourly wage (CNY) and gender distribution for rural-urban migrants

Year		Gender distribution (No. and %)	Hourly wage (mean)	Std. dev	Difference[24]	Pr. (Ho: diff = 0)
2002	Male	1,862 (56.84%)	3.66	5.35	1.22 (33.33%)	0.00
	Female	1,414 (43.16%)	2.44	1.89		
2007	Male	4,000 (60.71%)	7.40	5.61	1.31 (17.70%)	0.00
	Female	2,589 (39.29%)	6.09	4.23		
2013	Male	714 (59.50%)	16.45	15.53	4.89 (29.73%)	0.00
	Female	486 (40.50%)	11.56	10.87		

Source: CHIP data, author calculation

The nominal earnings of employed workers in China has increased rapidly since 2002. The mean value of the hourly wage of male rural-urban residents increased from CNY 3.66 in 2002 to CNY 16.45 in 2013, and that of females increased from CNY 2.44 to CNY 11.56, see Table 4.2. The difference in mean hourly wage was significant for rural-urban migrants from 2002 to 2013.

[24] Share of the difference = (hourly mean wage of men- hourly wage of women)/hourly mean wage of men

Table 4.3 Average hourly wage (CNY) and gender distribution for urban residents

Year		Gender distribution (No. and %)	Hourly wage (mean)	Std. dev	Difference	Pr. (Ho: diff = 0)
2002	Male	5,526 (55.5%)	6.12	4.6233	0.91 (14.87%)	0.00
	Female	4,429 (44.5%)	5.21	4.3260		
2007	Male	3,826 (57.61%)	15.54	15.4941	3.74 (24.07%)	0.00
	Female	2,816 (42.39%)	11.80	11.2586		
2013	Male	5,244 (56.20%)	20.38	20.3338	4.30 (21.10%)	0.00
	Female	4,082 (43.8%)	16.08	22.0469		

Source: CHIP data, author calculation

The mean value of male urban residents' wages per hour was CNY 6.12 in 2002 and it was CNY 20.38 in 2013, and that of females increased from CNY 5.21 in 2002 to CNY 16.08 in 2013, see Table 4.3. The share of the difference in mean hourly wage between men and women was about 15 % to 25 % for urban residents from 2002 to 2013, see Table 4.3.

Compared with urban residents, the wage level of urban and rural migrants has been greatly improved. From 2007 to 2013, the average wage value of urban and rural migrants doubled, while the average wage value of urban residents increased by over one-third. There is no doubt that between 2002 and 2013, the wage level of urban residents was much higher than that of rural-urban residents.

In 2004, the Chinese central government implemented the *Minimum Wage Regulations*. Thus, the average official nominal minimum wage per month rose by 13% annually from CNY 368 in 2004 to CNY 1,139 in 2013 (China Economic Net, 2006). This is a possible explanation for wage increases (Ma et al., 2012).

Considering the age structure of workers, the median age of rural-urban migrants was approximately 33 in 2002, and that was 29 in 2007 and was 37 in 2013. The trend of age distributions of rural-urban migrants fluctuated from 2003 to 2013 significantly. After 2007, the increase in the median age of rural-urban migrants is remarkable, as shown in Figure 4-2. The result proves the consequences were caused by changes in demographic factors in the Chinese labour market. Migrating workers in China are in the process of aging.

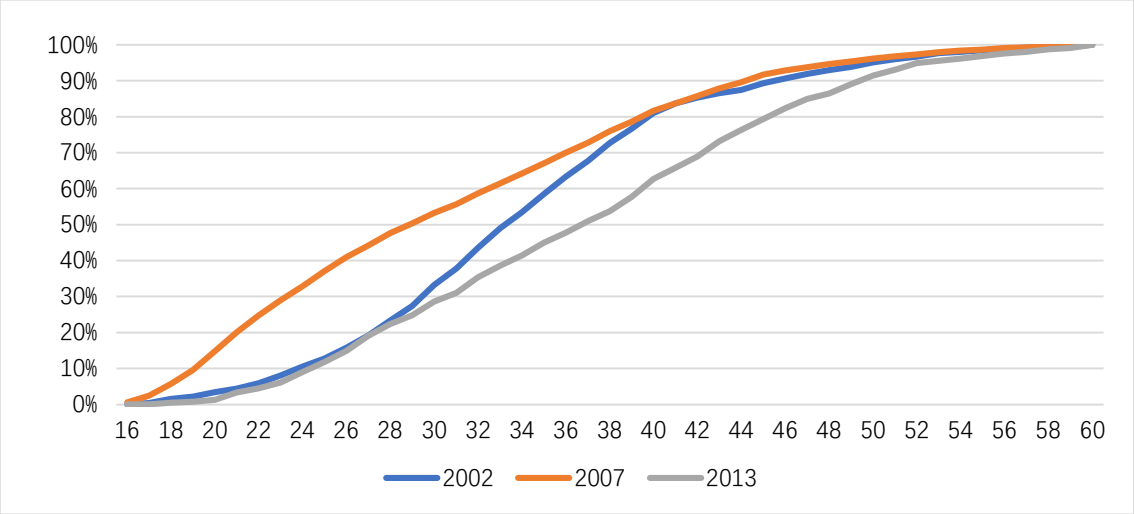

Figure 4-2 Age distribution for rural-urban migrants, CHIP 2002, 2007 and 2013

Source: Author's elaboration

The observed age distributions of urban residents show a roughly constant trend in 2002, 2007 and 2013. The median age of urban residents was 40, 38 and 41 in 2002, 2007 and 2013, respectively, as shown in Figure 4-3. The average age of local natives is higher than that of migrating workers, and the trend of the age structure of urban residents is more stable.

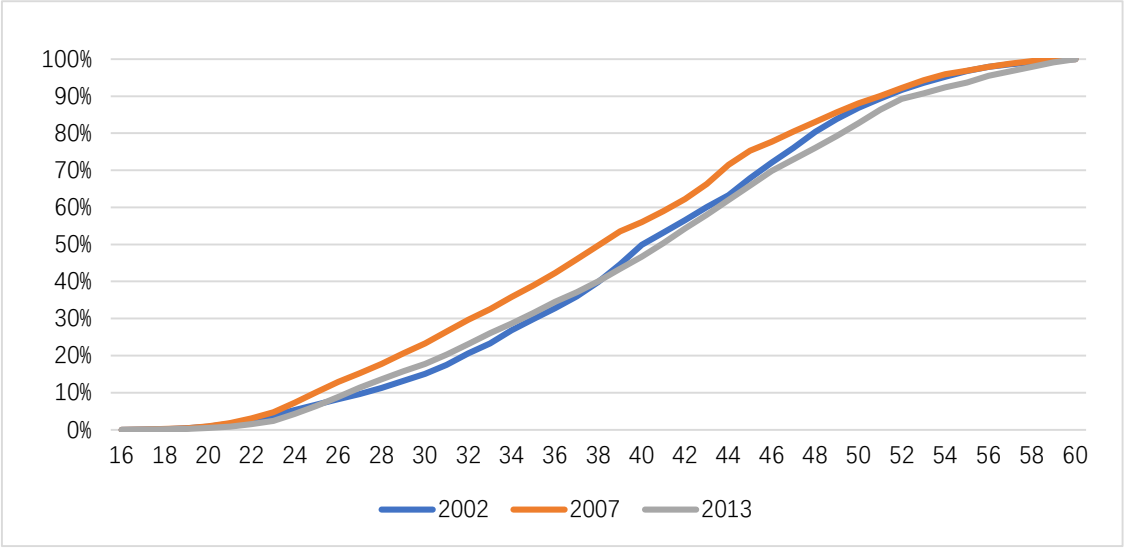

Figure 4-3 Age distribution for urban residents, CHIP 2002, 2007 and 2013

Source: Author's elaboration

Table 4.4 provides the details of the share of each age category of all observed workers.

Table 4.4 Share of each category of the age of observed workers

	2002	2007	2013	2002	2007	2013
Age group (%)	Rural-urban migrants			Urban residents		
16-24	12.8%	37.1%	11..8%	6.9%	10.2%	6.5%
25-35	45.7%	30.0%	33.2%	23.0%	28.7%	25.0%
35-50	36.6%	29.1%	46.4%	57.0%	49.2%	51.2%
Over 50	4.9%	3.8%	8.6%	13.1%	11.9%	17.3%

Source: Author calculation

In 2002, the workers aged 25 to 35 dominated the rural-urban migrants' group, the share of workers aged 25 to 35 was 45.7% of all migrants. In 2007, the share of young workers aged 16 to 24 was 37.1% of all observed rural-urban migrants, which subsequently decreased to 11.8% in 2013. Over 46% of rural-urban migrants were workers aged 35-50 in 2013 and the share of workers aged over 50 doubled from 4.9% in 2002 to 8.6% in 2013 of all observed rural-urban migrants.

In comparison, the age structure of observed urban residents was more stable between 2002 to 2013. Workers aged 35 to 50 dominated the labour market. The number of urban residents aged between 25 and 50 was about 80% of all urban residents over this period. The proportion of workers aged over 50 increased from 11.9% in 2007 to 17.3% in 2013 for urban residents.

The demographic structure of urban residents and the demographic structure of migrant workers have different trends in the same period, which prove that the sub-labour market of rural-urban migrants and the sub-labour market of the urban resident is segregated and different Change in the rural-urban migrants' age structure proves the serious challenge of the aging population in China.

Turning to the educational attainment of workers, the education of workers has improved significantly in the Chinese labour market since 2002. The share of each observed education group is shown in Table 4.5.

Table 4.5 Share of each category of the education level of observed workers

	2002	2007	2013	2002	2007	2013
Education group (%)	Rural-urban migrants			Urban residents		
Never been to school or have been elementary school	25.6%	13.8%	14.5%	2.83%	2.7%	4.8%
Junior middle school	54.6%	55.7%	51.2%	23.5%	18.7%	25.6%
Senior middle school	14.3%	17.9%	16.0%	28.1%	25.5%	18.4%
Specialized secondary school and Technical school	3.2%	8.4%	6.4%	12.5%	10.2%	11.9%
Polytechnic college	1.8%	3.5%	8.1%	22.7%	24.3%	19.4%
Undergraduate	0.5%	0.6%	3.5%	9.6%	15.6%	17.8%
Postgraduate	0%	0.03%	0.3%	0.7%	2.5%	2.1%
Other	--	0.1%	--	0.07%	0.5%	--

Source: Author calculation

The number of migrating workers who have the education of “never been to school or elementary school” fell from 25.6% of observed rural-urban migrants in 2002 to 13.8% in 2007. Since 2002, the scale of rural-urban migrants who have better education, such as the education of “polytechnic college and undergraduate”, increased significantly. In 2013, there were 8.1% of all migrants had the education of “polytechnic college”. The share of migrating individuals with the college’s education increased from 0.5% in 2002 to 3.5 % in 2013.

Meanwhile, the main component of rural-urban migrants is workers who have the education of "junior middle school". The share of those workers accounted for about 50% between 2002 and 2013 in the Chinese migrants' sub-labour market.

The education level of urban residents continues to improve as well, especially with regards to higher education. In 2002, workers who had the college education accounted for 9.6% of all observed urban residents, which rose to 17.8% in 2013. Similarly, the number of urban residents who had received postgraduate education had increased from 0.7% in 2002 to 2.1% in 2013. The number of workers with the education of “senior middle school” had gradually declined since 2002. The scale of individuals who have the education of “junior middle school” fluctuated between 18% to 25% of all observed urban residents between 2002 and 2013. It shows the consequences of China’s expansion of higher education since 2002.

Considering the types of employment in enterprise ownership, the employment structure of rural-urban migrants was more stable than that of urban-residents between 2002 and 2013, as shown in Table 4.6.

Table 4.6 Share of the groups by employment in enterprises ownership

Ownership group (%)	2002	2007	2013	2002	2007	2013
	Rural-urban migrants			Urban residents		
Government or public units	--	4.9%	3.5%	33.6%	36.4%	24.2%
State-owned enterprise	6.8%	4.9%	5.3%	34.0%	19.2%	16.7%
Collective-owned enterprise	3.7%	4.3%	3.5%	6.9%	6.1%	4.6%
Private-owned enterprise and individual business	82.2%	78.6%	78.2%	20.7%	30.7%	43.5%
Foreign-owned enterprise	0.6%	5.2%	2.3%	2.1%	4.5%	3.0%
Others	6.7%	2.1%	7.2%	2.7%	3.1%	8.0%

Source: Author calculation[25]

From 2002 to 2013, about 80% of rural-urban migrants worked in private-owned enterprises or individual businesses. There were less than 5% of migrants employed by the government or public units. In addition, the share of rural-urban migrants who worked for state-owned enterprises remained stable at about 5% to 6%. Turning to urban residents, the privatisation of the Chinese economy caused an increase in the size of employment in private enterprises. About 20% of observed urban residents worked in private-owned enterprises and individual business in 2002, which increased to 43.5% in 2013. The share of employment in state-owned enterprises for urban residents decreased from 34% in 2002 to 16.7% in 2013.

The employment structures in the Chinese labour market reflect the change in Chinese economic structure and development. Table 4.7 shows the distribution of workers in the group of employment sectors between 2002 and 2013.

Table 4.7 Share of categories of the employment sectors of observed workers

Ownership group (%)	2002	2007	2013	2002	2007	2013
	Rural-urban migrants			Urban residents		
Monopoly sectors	3.7%	4.0%	10.3%	13.8%	19.9%	16.3%
Competitive sectors	52.2%	55.0%	45.3%	15.5%	19.7%	22.3%
Public sectors	4.1%	7.6%	5.1%	27.9%	21.2%	24.0%
Other sectors	40.0%	33.4%	39.3%	42.8%	39.2%	37.4%

Source: Author calculation

From 2002 to 2013, the observed rural-urban workers were mainly employed in the competitive sectors, which accounted for about 50% of all observed migrants. About 5% of migrants worked in public sectors. The number of rural-urban migrants employed in monopoly

[25] This is no relevant information (government or public units) in the rural-urban migrant survey of CHIP 2012.

sectors had a remarkable increase from 3.7% in 2002 to 10.3% in 2013.

Compared with rural-urban migrants, the proportion of urban residents working in the public sector was about 22% to 28%, about one-fifth of the total number of urban workers observed. The employment rate of the urban population in the monopoly sector had not changed much. The number of employees working in competitive sectors increased by 50% from 2002 to 2013. The employment of urban residents showed a trend of diversification.

The development of the Chinese economy causes rapid growth in the tertiary industry. The development of productive business creates a huge demand for the worker. The number of migrating workers serving in the service industry and the production industry has grown rapidly. The share of service workers of all rural-urban migrants increased from 26.1% in 2002 to 46.1% in 2013. In 2013, over 26% of all migrating persons worked in productive industries, shown in Table 4.8.

Table 4.8 Share of categories of employment occupation

	2002	2007	2013	2002	2007	2013
Occupation group (%)	Rural-urban migrants			Urban residents		
Manager or director(self)	53.6%	15.9%	6.1%	10.9%	23.3%	5.3%
Technic staff	4.0%	0.8%	9.4%	21.1%	23.3%	18.7%
Clerk	2.4%	4.6%	4.7%	20.3%	23.9%	17.9%
Service worker	26.1%	52.2%	46.1%	12.3%	22.1%	30.0%
Production worker	6.8	26.0%	26.5%	28.6 %	16.0%	20.7%
Others	7.1	0.47%	7.2%	6.8%	7.5 %	7.4%

Source: Author calculation. Note: In 2002, there were 14 observed people (0.4% of all rural-urban migrants) who were the persons responsible within enterprise or institutions in this category ; the others are individual workers and labourers.

Urban residents showed some differences in the distribution of workers' employment occupation of workers than rural-urban migrants. Between 2002 and 2013, there were about 20% of urban residents working as professional staff in the labour market. Likewise, approximately one-fifth of urban residents worked as clerks. Meanwhile, the number of urban natives worked as service workers increased. However, the number of the urban workers involved in the production process had declined between 2002 and 2013, showing the deindustrialisation of urban natives' employment.

Table 4.9 presents the distribution of workers of rural-urban migrants and urban residents

who have different employment contracts from 2002 to 2013.

Table 4.9 Share of categories of employment contract

	2002	2007	2013	2002	2007	2013
Contract category (%)	Rural-urban migrants			Urban residents		
Permanent contract	0.5%	9.3%	3.1%	57.8%	34.0%	25.8%
Long-term contract	4.8%	30.4%	15.3%	21.2%	42.4%	25.2%
Temporary or short-term contract	25.4%	9.1%	18.0%	11.2%	6.2%	16.8%
No contract	66.7%[26]	27.4%	30.8%	7.4%	9.2%	16.1%
Others	2.6%	23.8%	32.8%	2.4%	8.2%	16.1%

Source: Author calculation

Between 2002 and 2013, many rural-urban residents worked without a contract or with a temporary or short-term contract. About 66.7% of all observed migrating workers served without any contract in 2002 especially. Between 2002 to 2013, only a few rural-urban migrants had permanent work contracts. It is a serious problem for rural-urban migrants to work without a formal contract. Due to its considerable(those workers represented about 50% of all migrating workers in 2013), it cannot be ignored.

In 2002, 57.8% of urban residents had permanent employment contracts; this proportion dropped to 25.8% in 2013. The number of urban natives working in informal sector employment increased. Similarly, the number of urban residents who worked with a short-term contract or without a contract gradually rose.

The box plots graphs of the logarithm of hourly wage (2002, 2007, 2013) are shown in the Appendix section. Considering the possibility of some extreme distribution of the observations (the outliers), this thesis utilises the detection procedure of *Hadimvo*[27] in STATA software, which was introduced by Hadi in 1992. The results state that there are no outliers remaining.

4.2 Methodology

Wages are remuneration for personal work. According to the human capital theory, individual income is determined by the personal characteristics of human capital. But how do we measure and compare different human capital investment returns by quantity or unit? Mincer expresses the relationship between individual income and human capital in terms of categories such as

[26] This includes the individual business or self-employed.

[27] *Hadimvo* identifies multiple outliers in multivariate data and the default is p (.05).

age, education, and tenure in his book *Schooling, Experience and Earning* (1974).

4.2.1 Mincer Method

The Mincer Earnings Function is a simple and tractable regression model and is widely used in the study field. The standard Mincer Earnings Function uses the method of Ordinary Least Squares (OLS, henceforth).

As the most popular and influential method to analyse the determination of individual wages, this model explains the relationship between the log of wages with individual schooling and experience (and squared experience). It provides an approach to price the elements of human capital productivity or to compare the return rate of human capital investment with the market rate (Heckman et al., 2003). This model includes the basic variables: earning return rate, educational attainment, and work experience.

The standard Mincer Earnings Function is shown in 4.1.

$$Ln(wage) = \alpha_0 + \alpha_1 Edu + \alpha_2 Exp + \alpha_3 Exp2 + \mu,\ E(\mu) = 0 \qquad (4.1)$$

where *Ln(wage)* is the log of real wage per hour of the worker, *Edu* represents the variable of educational attainment, *Exp* is a variable of the work experience in the labour market. *Exp* ^{2} is a variable of the squared of work experience. α_1 is "the rate of return to schooling". α_2 is the estimated coefficient that represents the return rate of working tenure to log wage. The error term μ is the classical error term. This baseline equation is estimated by using the OLS procedure.

The Mincer Earnings Function is a model for income determination. Therefore, according to the research purposes, users can extend the model by adding more variables, such as gender, region, and factors of employment.

To test the contribution of gender on the individual wage, the expanded Mincer Earnings Function is used, see equation 4.2.

$$Ln(wage) = \alpha_0 + \alpha_f Female + \alpha_1 Edu + \alpha_2 Exp + \alpha_3 ExpSq + \mu,\ E(\mu) = 0 \quad (4.2)$$

where *Female* is a dummy variable that represents the gender of the worker, which equals one for women and equals zero for men. α_f represents the return rate to the log hourly wage of gender. Moreover, the equation of linear regression to estimate the logarithm of hourly wage of the individual i, $i=1,\cdots,n$, is shown as equation 4.3.

$$Ln(wage_i) = \beta_{ij} X_j + \mu_i, \quad E(\mu_i) = 0 \tag{4.3}$$

where *Ln(wage)*, *Female* and i are described as above. Matrix X is a vector of explanatory variables, j is the number of explanatory variables, β is the vector of estimated coefficients and μ is the classical error term.

Generally, the explanatory variables in the labour market which study the determination of individual wages include the following subsets. First, the demographic factors such as age, location of the current employment, marital status, and the number of children, etc. Second, the human capital factors such as years of experience, experience, educational attainment, and training on the job, etc. Third, employment factors such as the sector of employment, occupation, way of finding the current job, professional title, size of the firm, contract of employment, ownership of the enterprise, etc. Fourth, other individual factors such as the soft skills of workers, etc.

The extended model employed in this doctoral dissertation includes the control variables of demographic factors, human capital factors and employment factors listed in Table 4.1. Furthermore, the model is shown as follows:

$$Ln(wage) = f\begin{bmatrix} demographic\ characteristics \\ (age, location\ \ of\ work, marital\ status, etc.) \\ human\ capital\ characteristics \\ (education, experience,\ \ etc.) \\ employment\ characteristics \\ \begin{pmatrix} ownership\ of\ enterprise, sector\ of\ employment, \\ occupation, work\ contract, etc. \end{pmatrix} \end{bmatrix}$$

4.2.2 Blinder-Oaxaca decomposition

This doctoral dissertation uses the Blinder-Oaxaca decomposition introduced by Oaxaca and Blinder (1973) separately to analyse the differences in the logarithm of hourly wage between male full-time employees and females.

Oaxaca and Blinder started the technical study on the decomposition of the wage gap in the labour market in the 1970s. The Blinder-Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973) is used to explain the differential of wage by the specific group, a method which is widely applied later. The Blinder-Oaxaca decomposition purposes to examine the part of differences in gender wage caused by the observed characteristics of workers and to identify the differentials section of the gender wage gap that cannot be explained by the selected variables

in the Mincer regression model.

The difference in the mean value of the outcome between group A and group B is shown as equation 4.4.

$$D = E(Y_A) - E(Y_B) \tag{4.4}$$

where $E(Y_i)$ is the expected value of the dependent variable of the specific group *i.*

Y_i is calculated by the linear model, shown as equation 4.5.

$$Y_i = \beta_i X_i + \mu_i, \quad E(\mu_i) = 0 \quad i \in (A, B) \tag{4.5}$$

where *X* is the vector. It contains the independent variables and a constant which represents the intercept. β is the slope parameter, μ is the error item. The differential of the expected value of the independent variable between group *A* and group *B* is calculated by equation 4.6, shown as follows.

$$D = E(Y_A) - E(Y_B) = \beta_A E(X_A) - \beta_B E(X_B) \tag{4.6}$$

Based on equation 4.1 and only considering that one single regressor (education) with the assumption that men have the advantage in return of educational attainment to individual wage than the women. The difference in wage between the male and the female group is shown as equation 4.7.

$$D = E(W_m) - E(W_f) = \beta_m E(X_m) - \beta_f E(X_f) \tag{4.7}$$

"Wage discrimination" means the difference in the wage of male and female workers who have the same individual skills or personal capability of production. Considering to the difference in wage between men with x_m years of education and women with x_f years of education, let $\hat{\beta}_m$ and $\hat{\beta}_f$ be the regression estimates of the return of education to the wage of males and females, respectively. The difference in wages between men and women is shown in equation 4.8.

$$w_m - w_f = \hat{\beta}_f (x_m - x_f) + \Delta\hat{\beta} * x_m \tag{4.8}$$

where $\Delta\hat{\beta}$ equals to $(\hat{\beta}_m - \hat{\beta}_f)$. It proposes to measure the difference in the educational attainment between men and women in the labour market.

Figure 4-4 shows the graphical description of the Blinder -Oaxaca decomposition.

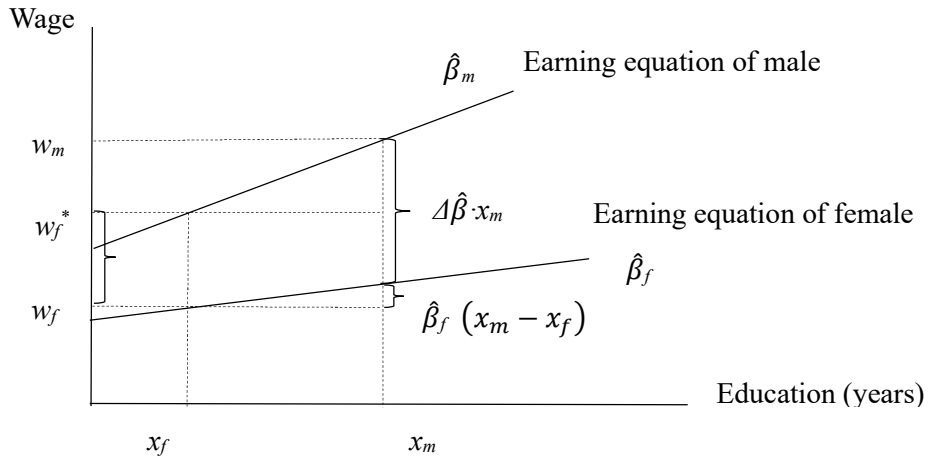

Figure 4-4 Blinder - Oaxaca decomposition

Source: Author's elaboration

The vertical distance $(w_m - w_f)$ represents the wage differentials between men and women, which consists of two parts. The first is the partial difference in wages between men and women $\hat{\beta}_f(x_m - x_f)$ caused by the difference in schooling experience $(x_m - x_f)$ (the explanatory variable). The second is the partial difference in wages between men and women caused by the interaction of difference in the coefficient of education between two groups and the education level of male workers ($\Delta\hat{\beta} * x_m$).

The decomposition of wage in equation 4.8 can be written as a more general decomposition equation as in equation 4.9 and equation 4.10.

$$w_m - w_f = \hat{\beta}_f * \Delta x + \Delta\hat{\beta} * x_f + \Delta\hat{\beta} * \Delta x \quad (4.9)$$

$$or \quad w_m - w_f = \hat{\beta}_m * \Delta x + \Delta\hat{\beta} * x_m + \Delta\hat{\beta} * \Delta x \quad (4.10)$$

where Δx equals to $(x_m - x_f)$. In equation 4.10, the women's wage is accepted as the payment without discrimination, and the men have the wage premium in the labour market. In contrast, the wage structure of men is the non-discriminatory wage structure in the labour market and women receive the negative discrimination in wage in equation 4.11.

According to the Mincer Earnings Equation, this doctoral dissertation uses the logarithm hourly wage to measure the income of male and female workers. More generally, let $\overline{X}_m$ and $\overline{X}_f$ are the mean vector of regressors (e.g. education, experience, etc.) for male and female

groups, respectively. The difference in wages between men and women is decomposed into three parts, shown in equation 4.11.

$$Difference = Ln\overline{W}_m - Ln\overline{W}_f$$

$$= \hat{\beta}_m(\overline{X}_m - \overline{X}_f) + (\hat{\beta}_m - \hat{\beta}_f)\overline{X}_m - (\hat{\beta}_m - \hat{\beta}_f)(\overline{X}_m - \overline{X}_f) \qquad (4.11)$$

This is the "three-fold" decomposition, where $\hat{\beta}_m(\overline{X}_m - \overline{X}_f)$ is the first component of the differential of wage between women and men. This first part measures the expected change in wage due to the difference in the explanatory variables ($\overline{X}_m - \overline{X}_f$). Therefore, it (the "endowments" effect) explains the wage differential calculated by the difference in observed characteristics between the two groups and the labour market price of male characteristics.

The second component $(\hat{\beta}_m - \hat{\beta}_f)\overline{X}_m$ is the consequence calculated by the mean of male characterises and the difference in the coefficients between the two groups (the coefficients). $(\hat{\beta}_m - \hat{\beta}_f)$ represents the coefficient differentials between the two groups. $(\hat{\beta}_m - \hat{\beta}_f)(\overline{X}_m - \overline{X}_f)$ is the interaction between the coefficients and the endowments (Oaxaca,1973; Blinder, 1973; Jann, 2008; Guo et al, 2011).

The Blinder - Oaxaca decomposition tries to explain that how much of the differential of wage can be explained by the group's difference in characteristics and how much of the differential of income is caused by the invisible factors such as the discrimination by gender. In the "two-fold" division, the difference in wage between the two groups could be decomposed into the "explained part" (remuneration of individual characteristics) and the " unexplained part" （Oaxaca, 1973; Blinder,1973). It is shown as follows:

$$Difference = \underbrace{\hat{\beta}_m(\overline{X}_m - \overline{X}_f)}_{\text{"Explained Part"}} + \underbrace{(\hat{\beta}_m - \hat{\beta}_f)\overline{X}_m - (\hat{\beta}_m - \hat{\beta}_f)(\overline{X}_m - \overline{X}_f)}_{\text{"Unexplained Part"}}$$

Therefore, the difference of outcome (e.g. wage) could be divided into the "explained part", which is caused by the difference in observed parameters (e.g. education, age, employment factors, etc.) such as Δx in equation 4.11 and the "unexplained part", caused by the discrimination in gender and other unobserved variables or unknown reasons in the labour market.

To analyse the discrimination in the labour market, let $\hat{\beta}_*$ be a set of benchmark coefficients (i.e. the coefficients of the non-discriminatory wage structure). Reimers (1983) uses different sets of weights to measure the discrimination against the minority group (D = I), and the white non-Hispanic (D = 0). Then the average of the two (D = 0.5I) is the expression of the non-discriminatory wage structure. The non-discrimination wage structure between men and women can be is calculated in equation 4.12

$$\hat{\beta}_* = D\hat{\beta}_m + (1 - D)\hat{\beta}_f \tag{4.12}$$

where *D* is the weight of the wage structure of a male group. In the study of Oaxaca (1973) and Blinder (1973), *D* equals 1 or 0, so $\hat{\beta}_*$ is equal to $\hat{\beta}_m$ or $\hat{\beta}_f$. It means that the bench group is the male group or female group, respectively. According to the study of Reimers (1983), *D* is equal to 0.5. The non-discrimination wage structure is the middle value of the coefficients of the regressor, shown in equation 4.13.

$$\hat{\beta}_* = 0.5 * \hat{\beta}_m + 0.5 * \hat{\beta}_f \tag{4.13}$$

With the decomposition approach, it needs to propose one wage structure as the non-discrimination benchmark. Choosing different non-discriminatory wage structure benchmarks will result in different ratios of gender wage differences. This is the so-called "*index problem*" (Mincer, 1973; Guo et al., 2011).

Cotton (1988) indicates that the discrimination and favouritism exist in the labour market simultaneously. He tested the difference in wages between white males and black males. According to his work, the non-discriminatory wage structure of men and women is shown in equation 4.14.

$$\hat{\beta}_* = F\hat{\beta}_m + (1 - F)\hat{\beta}_f \tag{4.14}$$

where F is the share of male population of all employment populations in the labour market. $(1 - F)$ represents the share of employed women in the labour market, and F is the value belong from 0 to 1.

More scholars (Neumark, 1988; Guo et al., 2011) are trying to perfect the research on wage differences among workers. In this doctoral thesis, male wages are regarded as a non-discriminatory wage structure.

4.2.3 Quantile Regression

This doctoral dissertation employs the linear model of quantile regression to retest the contribution of the explanatory factors on the worker's wage based on the entire wage distribution. The classic Mincer Earnings Function is a regression model with the method of OLS in the mean value of the personal wage. The Quantile Regression method is the alternative method of linear regression when the conditional mean of linear regression is not applicable and has the robust results of estimates from the coefficient of variables in the model.

The OLS method provides the predicted mean value of wages of workers by the regression equation (Mincer Earnings Equation) under the condition of the mean value of explanatory variables (e.g. education, age, etc.). It is impossible to observe the change in the independent variable across the entire distribution of the dependent variable. Considering the wage of workers, the OLS method possibly ignores the important variations of wage differences across the entire wage distribution. The OLS method also requires the assumption that the error term should be normally distributed and satisfy zero mean. The wage distribution in the real world hardly satisfies these assumptions, such as the distribution of data has heavier tails and a taller peak. It is necessary to use another method to achieve a precise result of the difference in wage decomposition and a robust result of estimated regression.

Koenker and Bassett (1978) introduced the idea of quantile regression. The quantile regression method, based on the estimation of conditional quantile functions, provides the possibility to estimate an independent variable on a specified quantile of sample distribution including the median of the dependent variable in a linear model. The results of quantile regression comprehensively describe the whole conditional distribution of variables, rather than just examining the conditional expectation (mean) of the explanatory variable. It is more robust to outliers than the least ordinary squares regression method.

Considering the wage determination, the quantile regression method shows the difference in estimates of wage determinants across the whole wage distribution (Chen and Duan, 2009; Machado and Mata, 2005; Wang, 2010; Qian and Jiang, 2011; Landmesser, 2016).

Using the quantile regression method to estimate the equation 4.6, then the linear model of quantile regression is then represented as shown in equation 4.15.

$$Q_Y(\tau/X_i) = g(X_i) = \beta(\tau)X_i + \mu_{\theta i}, \qquad \tau\epsilon(0,1) \tag{4.15}$$

where τ is the selected quantile point, $\beta(\tau)$ is the coefficients of the regression parameters associating with the $\tau-th$ percentile, and μ_i is an error term.

The Quantile Regression uses the Weighted Least Absolute to estimate the coefficient of variables in the linear model. To obtain the optimisation of the coefficient $\hat{\beta}(\tau)$ of the regression estimator for the quantile τ , it is necessary to solve the equation 4.16.

$$\min_{\beta \in R}\{\sum_{Y_i \geq \beta x_i} \tau|y_i - \beta x_i| + \sum_{Y_i \leq \beta x_i}(1-\tau)|y_i - \beta x_i|\} \quad (4.16)$$

CHAPTER 5 RESULTS

This section presents the estimated results of the different forms of the Mincer Earnings Function regression for rural-urban migrants and urban residents, respectively. It also states the results of the Blinder-Oaxaca decomposition. A comparative empirical analysis is conducted to present the difference in wage determination and the gender wage gap between rural-urban migrants and urban residents in China.

5.1 Descriptive statistics results

5.1.1 Difference in gender wage

Figure 5-1 shows the differentials of wages between men and women for rural-urban migrants. More precisely, Figure 5-1 depicts the mean value and quantile values (0.1-quantile, 0.5-quantile and 0.9 quantile) of female wages as a percentage of male wages in 2002, 2007 and 2013.

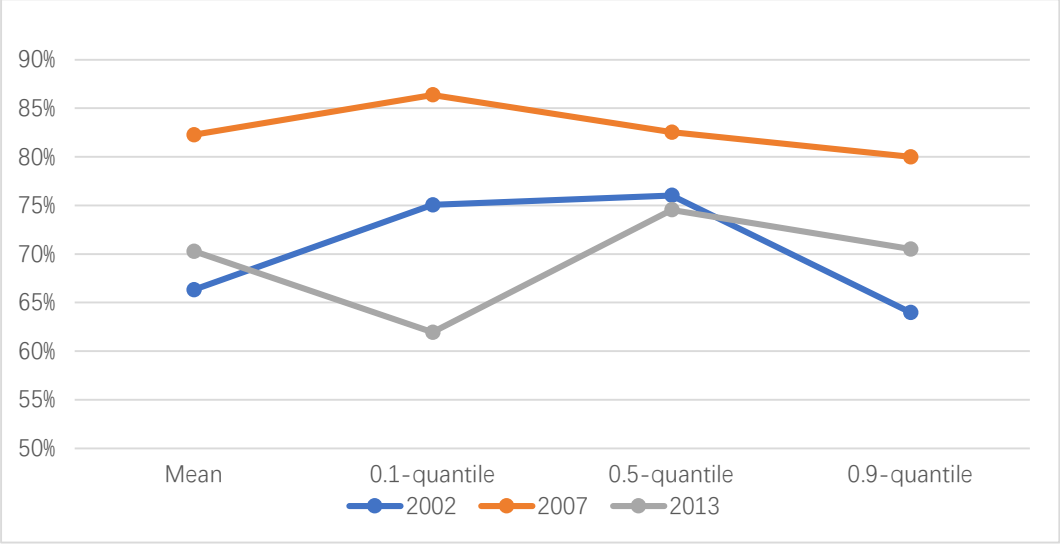

Figure 5-1 The percentage of female migrants' wages to males' wages

Source: Author's elaboration

The statistical data in Chapter 4 proves that the overall mean wage of women was less than that of men, and that women had a significant disadvantage in earnings in the Chinese labour market between 2002 and 2013. Considering rural-urban migrants, the mean gender wage difference in 2007 was the smallest, with women earning roughly 83% of the wages of men on average. In 2002 and 2007, women had average wages of 65% to 70% of the wages of men received. The gender wage differentials are higher at the top end of the wage distribution than

that at the middle and bottom of the wage distribution. This result is similar to previous research from Wang (2010) as well as Magnani and Zhu (2012). It shows that there is a "Glass Ceiling Effect" rather than a "Sticky Floor Effect" of the gender wage gap for the migrating workers. In 2013, it appears that the differences in wages were highest at bottom of the wage distribution of migrating workers.

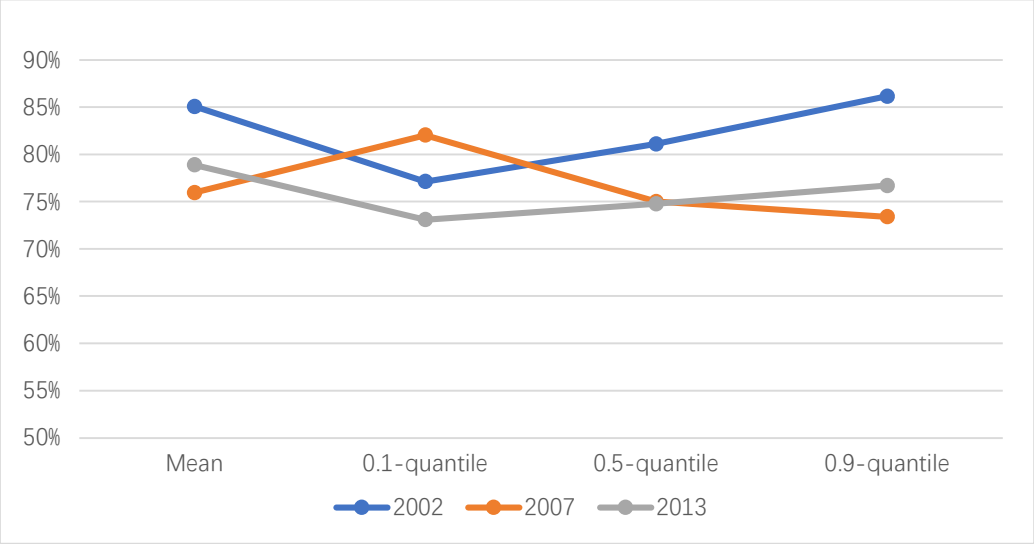

Figure 5-2 The percentage of female urban residents' wages to males' wages

Source: Author's elaboration

Figure 5-2 reports the difference in wages between male urban residents and females. The results are similar to the findings in past research (Song et al., 2017; Chen 2011). The average gender wage gap of urban residents widened (the mean ratio of the gender wage gap decreased from 15% to 25% between 2002 and 2007), then narrowed to about 21% in 2013. Moreover, this thesis finds that in 2002 and 2013, the difference in gender wage narrowed when moving from the bottom to the top of wage distribution. It shows that there is a "Sticky Floor Effect" rather than a "Glass Ceiling Effect" of the gender wage gap. Urban female workers with low-incomes have more inequality in gender wages than females with high-incomes. In contrast, in 2007, the women who had high earnings suffered more wage discrimination than those women with low earnings.

5.1.2 Differences in wages between regions

Table 5.1 shows the mean value of the logarithm of hourly wage and the difference contained within between men and women for rural-urban migrants in West China, Middle China, and

East China in 2002, 2007, and 2013.

Table 5.1 Difference in log hourly wage of rural-urban migrants in China by regions

Year	Region	Log hourly wage (mean)	Difference (%)	Pr. (Ho: diff = 0)	M-f	M-m[28]
2002	West	0.728			0.580	0.762
	Middle	0.911	0.183(25.1%)	0.00	0.613	1.022
	East	0.920	0.192(26.4%)	0.00	0.762	1.034
2007	West	1.566			1.321	1.650
	Middle	1.582	0.016(1.0%)	0.44	1.391	1.609
	East	1.912	0.346(22.1%)	0.00	1.833	1.966
2013	West	2.441			2.317	2.661
	Middle	2.373	0.068(2.8%)	0.23	2.143	2.551
	East	2.523	0.082(3.3%)	0.15	2.479	2.631

Source: Author's elaboration

In 2002, the mean wage of rural-urban migrants in West China was significantly less than that in Middle China and East China. In 2007, the wages in Eastern China had obvious advantages over the wages in Western China, but the difference in workers' wages between central and western China was no longer significant. In 2013, for rural-urban migrants, the difference in wages between various regions in China was not significant.

The median wage distribution of workers shows similar results. For example, the median wage of workers in central China was basically the same as that in western China, while the median wage in eastern China was significantly higher.

Table 5.2 shows the mean of the logarithm of the hourly wage distribution and the difference contained therein between men and women for urban residents in West China, Middle China, and East China in 2002, 2007, and 2013.

In comparison, the differentials of wage between workers in West China and East China was small in size in 2002. In 2007, the mean wage of works in West China was fewer than that of workers in East China by 20.1% with the statistical significance. The difference in wages between urban residents in Middle China and East China was slight in 2007 and 2013. Turning to the median wage, the wage of male local natives in East China is the highest among the three regions in China. The median wage for women in the central region was the highest in 2002

[28] M-f refers to the median value of female wage distribution, M-m refers to the median value of male wage distribution.

and was lower than in the other two regions in 2007 and 2013. This is similar to the distribution of average wages of all workers in the three regions.

Table 5.2 Difference in log hourly wage of rural residents in China by regions

Year	Region	Log hourly wage (mean)	Difference	Pr. (Ho: diff = 0)	M-f	M-m
2002	West	1.416			1.407	1.589
	Middle	1.600	0.184(13.0%)	0.00	1.532	1.657
	East	1.506	0.090(6.4%)	0.00	1.413	1.661
2007	West	2.137			2.014	2.238
	Middle	2.128	-0.009(-0.4%)	0.69	1.987	2.238
	East	2.590	0.453(20.1%)	0.00	2.363	2.749
2013	West	2.505			2.408	2.659
	Middle	2.505	0.000(0.0%)	0.98	2.364	2.669
	East	2.772	0.267(10.7%)	0.00	2.654	2.897

Source: Author's elaboration

5.1.3 Wage across age groups

Figure 5-3 to Figure 5-5 shows the mean value of the logarithm of real wage distribution across the ages of rural-urban migrants and urban residents in 2002, 2007 and 2013.

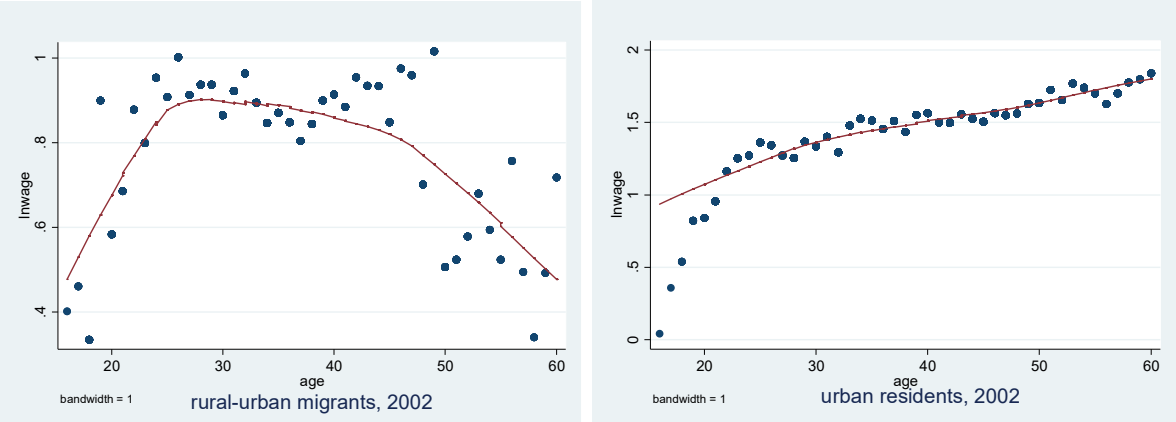

Figure 5-3 Logarithm of the hourly real wage across the ages, 2002

Source: Author's elaboration

In 2002, the age increased the wages of rural-urban migrants at the beginning of their work stage and significantly decreased that of migrating workers aged over 50. In contrast, the wages of urban residents increased steadily with age, with the group of urban natives aged over 50 having the highest wage for work. Age positively influences the local natives' wages.

In 2007, the hourly wage - age curve showed the same trend as that in 2002 for rural-urban migrants. The average age of migrating workers roughly increased up to 30 years old and

decreased gradually after that. The hourly wage curve of urban residents showed fluctuation during the whole age distribution. The workers' average wage had a peak at 30 years old and had another peak when their age was 60 years old.

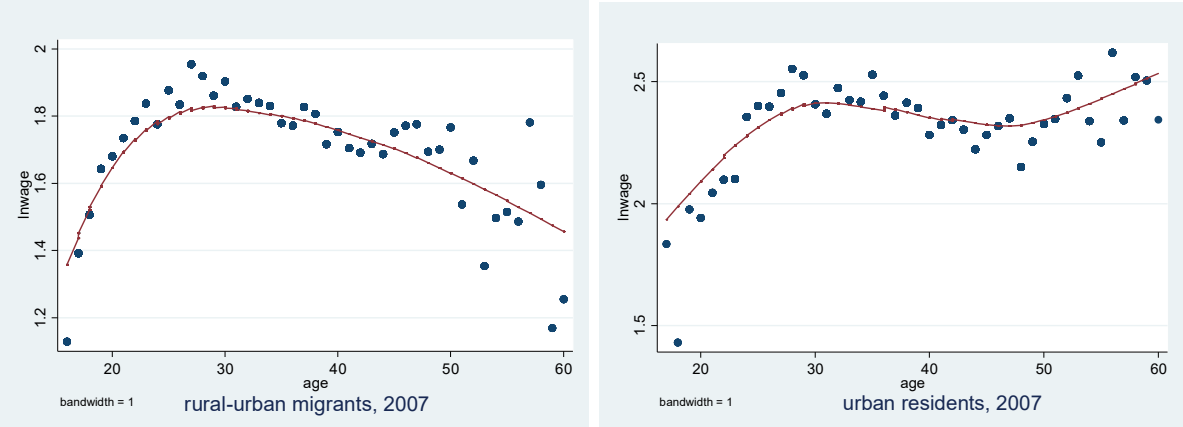

Figure 5-4 Logarithm of the hourly real wage across ages, 2007

Source: Author's elaboration

The hourly wage - age curve of rural-urban migrants in 2013 fluctuated more smoothly than that in 2002 and 2007. The peak of the average wages of migrating workers appears around 35 years old. The hourly wage - age curve of urban residents shows the differences compared with that in 2007. The average wages of local natives decreased after 40 years old. The disadvantages of senior age workers in regards to wages are remarkable.

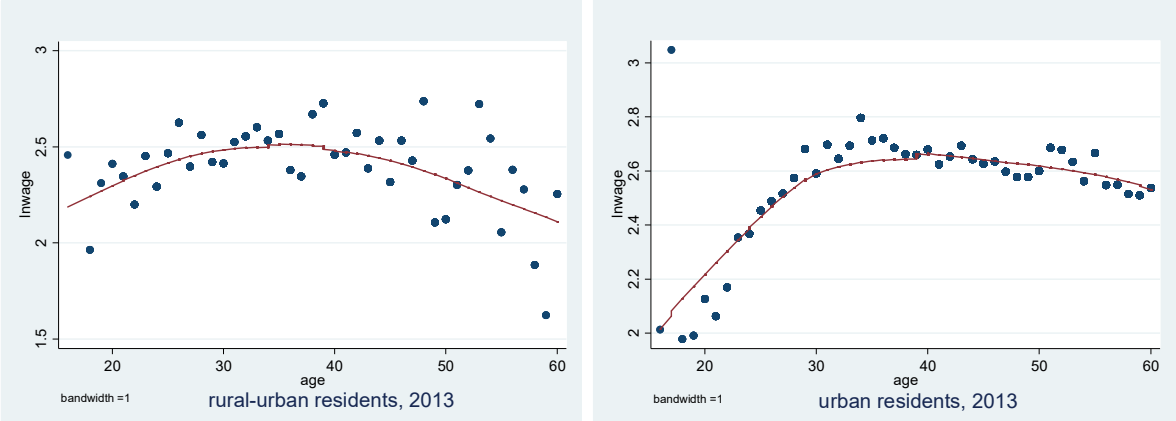

Figure 5-5 Logarithm of hourly real wage across ages, 2013

Source: Author's elaboration

5.2 Empirical Results

5.2.1 The determinants of wages

This subsection shows the estimates of the coefficients of explanatory variables of the regression model for the individual wage of rural-urban migrants and urban residents in CHIP

2002, CHIP 2007 and CHIP 2013 with the method of OLS regression. The following subsections run wage regressions by separate equations for the rural-urban migrants and urban residents. This reveals the correlation between the independent variable and the dependent variable. All statistics results reported in this dissertation are calculated using Robust standard errors. Model specification for multiple regressions (test for the multicollinearity and omitted variables bias) is also carried out.

A. The basic wage regression

The basic analysis of determinants of rural-urban migrants and urban residents is carried out by OLS regressing the observations of CHIP 2002, CHIP 2007 and CHIP 2013 with equation 4.3. The explanatory factors are basic personal characteristics of the workers, which include gender, age, location, *Hukou*, nation, and marital status. Those variables are employed in the basic wage regression to control for relevant influence on individual productivity. The basic wage regression is run for rural-urban migrants and local natives separately to examine the contributions of the relevant factors and wage differences between men and women between 2002 and 2013. The results of the basic wage regression are reported in Table 5.3.

According to the sign of the estimates and adjusted R-squared statistics, the baseline model performs reasonably well. Between 2002 and 2013, female workers in the Chinese labour market had significantly less wages than males, as shown in Table 5.3.

Table 5.3 Basic OLS regression (the logarithm of hourly wage)

	Rural-urban migrants			Urban residents		
Explanatory variables	2002	2007	2013	2002	2007	2013
Female	-0.305***	-0.197***	-0.357***	-0.150***	-0.273***	-0.269***
	(0.022)	(0.013)	(0.039)	(0.014)	(0.017)	(0.016)
West China			Reference			
Middle China	0.185***	-0.001	-0.067	0.190***	-0.020	-0.009
	(0.029)	(0.019)	(0.056)	(0.019)	(0.023)	(0.020)
East China	0.203***	0.352***	0.087	0.096***	0.450***	0.259***
	(0.026)	(0.017)	(0.057)	(0.016)	(0.021)	(0.020)
Age	-0.009***	-0.006***	-0.006**	0.012***	-0.007***	-0.002
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Rural *Hukou*			Reference			
Urban *Hukou*	0.246***	0.139**	0.039	0.555***	0.213***	0.222***
	(0.078)	(0.064)	(0.075)	(0.060)	(0.035)	(0.030)
Minority			Reference			
Han	0.024	0.029	-	-0.070**	0.115	0.064*
	(0.042)	(0.046)	-	(0.034)	(0.085)	(0.039)
Single			Reference			
Married	0.233***	0.146***	0.091	0.064**	0.204***	0.176***
	(0.043)	(0.018)	(0.059)	(0.028)	(0.028)	(0.029)
Divorced/Widowed	0.337***	0.145***	0.056	0.013	0.053	0.077
	(0.112)	(0.043)	(0.104)	(0.060)	(0.047)	(0.047)
Constant	0.906***	1.702***	2.443***	0.449***	2.033***	2.308***
	(0.068)	(0.053)	(0.142)	(0.074)	(0.117)	(0.057)
Observations	3,276	6,589	1,200	9,955	6,642	9,326
Adjusted R-squared	0.079	0.130	0.083	0.067	0.148	0.069
*** p<0.01, ** p<0.05, * p<0.1						

Source: Author's elaboration, standard errors in brackets[29]

In 2002, the female rural-urban migrants had less wages than the male by 30.5%. In 2007, the gender wage gap was 19.7 % for migrating workers. In 2013, the differential of wages between men and women increased to 35.7% for the rural-urban migrants.

In 2002, women had fewer wages than men by 15%. In 2007, the gender wage gap of urban residents rose to 27.3%. In 2013, the gender differential of the wages of urban residents was 26.9%.

Regional factors affect the wages of workers significantly in China. In 2002, the companies and institutions in East and Middle China provided higher wages to the employees

[29] In CHIP 2013, there were too few observation objects belonging to the minority family to analyse.

than in West China for both rural-urban migrants and urban residents. In 2007, the wage advantage of workers in East China expanded. Full-time employed urban workers in East China had higher wages by 45% than urban workers in West China.

Turning to the wages of rural-urban migrants, the location factor of work increased the wages of workers positively and significantly in 2002 and 2007. However, the results in this research show that it was not significant in 2013.

The urban *Hukou* positively increased the wages of workers in China significantly. In 2002, urban workers having the urban *Hukou* had higher wages than workers having the rural *Hukou* by 55.5%. From 2007 to 2013, the impact of *Hukou* on individual wages had declined. The urban *Hukou* increased workers' wages by about 22%.

The urban *Hukou* positively affected the wages of rural-urban migrants by 24.6% in 2002 and 14.6% in 2007. The effect of the urban *Hukou* on migrating workers' wages was not significant in 2013.

Turning to the factor of marriage, married workers earned more money than single workers in China for the rural-urban migrants between 2002 and 2007. The factor of ethnic minorities did not significantly affect the workers' wages.

B. The classical wage regression

Further analysis of wage determinants for rural-urban migrants and urban residents is carried out based on the classical Mincer Earnings Function. The explanatory variables in this model include the human capital characteristics, such as the educational attainment, work experiences of workers and the variables employed in the basic regression. In this model, the categories of individual education level are set to be the explanatory variables of educational attainment, see Table 5.4.

Table 5.4 Classical Mincer Earnings Function regression (the logarithm of hourly wage)

	Rural-urban migrants			Urban residents		
Explanatory Variables	2002	2007	2013	2002	2007	2013
Female	-0.258***	-0.171***	-0.357***	-0.120***	-0.240***	-0.261***
	(0.022)	(0.013)	(0.038)	(0.013)	(0.015)	(0.014)
West China			Reference			
Middle China	0.157***	-0.001	-0.067	0.173***	-0.002	-0.036*
	(0.028)	(0.019)	(0.057)	(0.017)	(0.021)	(0.019)
East China	0.168***	0.343***	0.074	0.082***	0.463***	0.186***
	(0.026)	(0.016)	(0.057)	(0.014)	(0.019)	(0.018)
Rural *Hukou*			Reference			
Urban *Hukou*	0.136*	0.035	-0.081	0.311***	-0.040	-0.017
	(0.073)	(0.060)	(0.074)	(0.059)	(0.034)	(0.030)
Minority			Reference			
Han	-0.007	0.058	-	-0.066**	0.170**	0.058
	(0.041)	(0.042)	-	(0.029)	(0.067)	(0.036)
Single			Reference			
Married	0.138***	0.052**	-0.027	0.024	0.164***	0.032
	(0.048)	(0.020)	(0.064)	(0.031)	(0.028)	(0.029)
Divorced/Widowed	0.295***	0.078*	-0.027	0.011	0.085*	-0.022
	(0.107)	(0.043)	(0.104)	(0.055)	(0.044)	(0.045)
Elementary school			Reference			
Junior middle school	0.157***	0.129***	-0.012	0.324***	0.161***	0.085**
	(0.028)	(0.021)	(0.060)	(0.041)	(0.050)	(0.039)
Senior middle school	0.306***	0.244***	0.143*	0.605***	0.364***	0.296***
	(0.041)	(0.025)	(0.078)	(0.043)	(0.050)	(0.041)
Technical school	0.433***	0.335***	0.124	0.771***	0.534***	0.369***
	(0.068)	(0.029)	(0.103)	(0.044)	(0.054)	(0.043)
Polytechnic college	0.532***	0.469***	0.258***	1.013***	0.795***	0.619***
	(0.085)	(0.044)	(0.096)	(0.043)	(0.052)	(0.042)
Undergraduate	0.746***	0.621***	0.578***	1.274***	1.059***	0.871***
	(0.178)	(0.091)	(0.114)	(0.046)	(0.053)	(0.042)
Postgraduate		1.391***	1.157***	1.520***	1.186***	1.294***
		(0.088)	(0.201)	(0.073)	(0.070)	(0.057)
Experience in years	0.019***	0.026***	0.032***	0.027***	0.015***	0.036***
	(0.005)	(0.003)	(0.009)	(0.003)	(0.003)	(0.003)
(Exp_sq2)/100	-0.051***	-0.068***	-0.074***	-0.017**	-0.024***	-0.062***
	(0.011)	(0.006)	(0.019)	(0.007)	(0.007)	(0.007)
Constant	0.437**	1.220***	2.014***	0.007	1.218***	1.757***
	(0.070)	(0.052)	(0.141)	(0.075)	(0.091)	(0.062)
Observations	3,274	6,582	1,200	9,945	6,608	9,325
Adjusted R-squared	0.120	0.179	0.120	0.222	0.323	0.212

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's elaboration, standard errors in brackets[30]

In Table 5.4, the variable *Undergraduate* means the education of a bachelor's degree and the variable *Postgraduate* includes the education of master's and doctoral degree. The variable *Exp_sq2* presents the value of squared years of work experience.

The coefficients have the expected signs and are statistically significant at the conventional significance levels. When controlling the explanatory variables of human capital characteristics, the difference in wages of men and women for rural-urban migrants decreased to 25.8% in 2002, 17% in 2007, and 35.5% in 2013, respectively. The gender wage gap for urban residents was 12% in 2002, 24% in 2007 and 26% in 2013, respectively with controlling all explanatory variables. After considering the human capital factor, workers in East China still had obvious advantages in wages.

In controlling the explanatory variables of human capital characteristics, except for the year 2002, the effect of the urban *Hukou* on the wages of workers was not significant.

Education plays a central role in human capital, which determines the individual wage for both migrants and urban residents in the Chinese labour market. Thus, schooling helps to increase the wages of workers significantly.

Wages varied over educational level groups. The first educational level group (never been to school and have been to elementary school) was used as the benchmark. In 2002, migrating workers with the education of middle school had higher wages by 15.7%. The education of senior middle school positively increased the wages of migrating workers by 30.6%. The education of polytechnic college and bachelor's degree significantly enhanced the wages in the same worker groups by 53% and 74%, respectively.

The wage differentials among education level groups narrowed. For example, the excess wage payment for education in the senior middle school declined from 24.4% in 2007 to 14.3% in 2013. Schooling in the polytechnic college increased individual wage by 53.2% in 2002 and it fell to 25.8% in 2013. From 2002 to 2013, the undergraduates of the migrating workers earned higher wages than workers in the benchmark group by about 60%, and the postgraduates had

[30] The explanatory variable "age" was omitted in the classical regression model and the expanded regression model because of its collinearity with the factor of the year of experience.

higher wages by 139% in 2007 and 115% in 2013 than those workers with basic education.

The educational factor performed more efficiently to increase the wages of urban residents' groups than that of rural-urban migrants between 2002 to 2013.

For urban residents, in 2002, the excess education return rates of junior middle school, specialised secondary school and technical school, the senior the middle school, polytechnic college, college and schooling of postgraduate on the workers 'wages were 32%, 60%, 77%, 101%, 127% and 152%, respectively. Investment in each category of education level positively improves the wages of workers significantly.

In 2007, the overall return of all levels of education had declined slightly for urban residents. The marginal positive education return rates of junior middle school, specialised secondary school and technical school, senior middle school, polytechnic college, college, and schooling of postgraduate on induvial wages were 16.1%, 36.4%, 53.4%,79.5%, 105% and 118% respectively. In 2013, these ratios fell to 8.5%, 29.6%, 36.9%, 61.9%, and 87.1%, respectively; however, the return rate of graduate education increased to 129.4%.

Working experience helped to improve the wages of workers. One year of work experience significantly increased the wages of migrant workers by 1.9% in 2002, 2.6% in 2007 and 3.2% in 2013. The trend of increasing returns from wages courtesy of work experience is significant. For urban residents, one year of work experience has led to a positive change in workers' wages during the same period, ranging from 1.5% to 3.6%.

C. The extended wage regression

Further analysis of the determinants of workers' wages was carried out by regressing the observations on explanatory variables. The explanatory factors include the basic demographic factors and human capital characteristics employed above, in addition to characteristics of employment(which include the occupation of workers), industrial sector, company's ownership, work contract type, way of finding the current job, and firm size, see Table 5.5.

Table 5.5 Extended OLS regression of the logarithm of hourly wage

	Rural-urban migrants			Urban residents		
Explanatory Variables	2002	2007	2013	2002	2007	2013
Female	-0.221***	-0.150***	-0.303***	-0.075***	-0.188***	-0.201***
	(0.022)	(0.013)	(0.039)	(0.012)	(0.015)	(0.015)
West China			Reference			
Middle China	0.135***	-0.031	-0.132**	0.170***	-0.018	-0.071***
	(0.028)	(0.019)	(0.056)	(0.016)	(0.020)	(0.019)
East China	0.148***	0.288***	0.011	0.082***	0.451***	0.160***
	(0.026)	(0.017)	(0.058)	(0.014)	(0.019)	(0.020)
Rural *Hukou*			Reference			
Urban *Hukou*	0.151**	0.039	-0.071	0.187***	-0.056*	-0.092***
	(0.076)	(0.060)	(0.078)	(0.057)	(0.032)	(0.033)
Minority			Reference			
Han	-0.011	0.048	0.227**	-0.074***	0.090	0.025
	(0.040)	(0.042)	(0.100)	(0.027)	(0.062)	(0.037)
Single			Reference			
Married	0.123**	0.027	-0.019	-0.014	0.120***	0.040
	(0.048)	(0.020)	(0.063)	(0.030)	(0.028)	(0.030)
Divorced/Widowed	0.315***	0.069*	0.027	-0.022	0.049	0.004
	(0.104)	(0.041)	(0.102)	(0.053)	(0.044)	(0.045)
Education in years	0.038***	0.040***	0.032***	0.064***	0.065***	0.067***
	(0.005)	(0.004)	(0.010)	(0.003)	(0.004)	(0.003)
Experience in years	0.014***	0.020***	0.020**	0.026***	0.008***	0.024***
	(0.005)	(0.003)	(0.009)	(0.003)	(0.003)	(0.003)
(Exp_sq2)/100	-0.039***	-0.056***	-0.046***	-0.025***	-0.020***	-0.042***
	(0.010)	(0.006)	(0.018)	(0.006)	(0.007)	0.067***
Employment occupation						
Manager or director			Reference			
Technic staff	0.181***	0.174**	-0.071	-0.008	-0.146***	0.011
	(0.062)	(0.080)	(0.090)	(0.021)	(0.031)	(0.035)
Clerk	0.111	0.039	-0.138	-0.080***	-0.216***	-0.112***
	(0.084)	(0.040)	(0.105)	(0.021)	(0.031)	(0.035)
Service worker	-0.063*	-0.147***	-0.253***	-0.326***	-0.336***	-0.222***
	(0.034)	(0.029)	(0.075)	(0.030)	(0.035)	(0.037)
Production worker	0.263***	-0.006	-0.108	-0.214***	-0.341***	-0.160***
	(0.051)	(0.031)	(0.079)	(0.023)	(0.035)	(0.038)
Others	-0.081	-0.322**	0.075	-0.386***	-0.278***	-0.164***
	(0.054)	(0.129)	(0.137)	(0.038)	(0.043)	(0.049)
Employment sector						
Monopoly			Reference			
Competitive	-0.316***	-0.063**	-0.106*	-0.221***	-0.094***	-0.070***
	(0.058)	(0.030)	(0.058)	(0.025)	(0.025)	(0.026)
Public	-0.288***	-0.137***	-0.220*	-0.052*	-0.058**	-0.154***

	(0.076)	(0.037)	(0.123)	(0.024)	(0.024)	(0.028)
Others	-0.269***	-0.096***	-0.150**	-0.205***	-0.134***	-0.162***
	(0.058)	(0.031)	(0.059)	(0.019)	(0.019)	(0.022)
Ownership of enterprise						
Government /public units			Reference			
State-owned		0.040	0.105	-0.111***	0.003	0.064**
		(0.035)	(0.155)	(0.020)	(0.022)	(0.028)
Collective-owned	0.051	0.099***	0.041	-0.275***	-0.071**	-0.011
	(0.056)	(0.038)	(0.167)	(0.029)	(0.032)	(0.040)
Private-owned	0.034	-0.047*	0.097	-0.153***	-0.017	0.088***
	(0.045)	(0.027)	(0.142)	(0.024)	(0.023)	(0.030)
Foreign owned	0.288**	0.018	0.290*	0.258***	0.229***	0.271***
	(0.140)	(0.035)	(0.167)	(0.048)	(0.036)	(0.047)
Others	-0.066	-0.236*	-0.140	-0.120**	-0.094**	-0.038
	(0.055)	(0.142)	(0.156)	(0.049)	(0.041)	(0.037)
Employment contract						
Permanent			Reference[31]			
Long-term		0.078***		0.045***	-0.182***	-0.093***
		(0.022)		(0.016)	(0.018)	(0.023)
Short-term/ temporary	-0.166***	0.032	-0.203***	-0.032	-0.393***	-0.308***
	(0.048)	(0.026)	(0.061)	(0.025)	(0.031)	(0.028)
No contract	-0.141**	-0.052**	-0.174**	-0.149***	-0.440***	-0.313***
	(0.059)	(0.021)	(0.068)	(0.028)	(0.031)	(0.032)
Way to find current job						
By self			Reference			
Through a referral by friend or family	-0.020	0.000	0.034	-0.003	-0.041**	-0.011
	(0.028)	(0.014)	(0.050)	(0.028)	(0.019)	(0.032)
Assigned by the government or through an open examination	0.209	0.008	0.025	0.027	-0.032*	-0.023
	(0.156)	(0.040)	(0.121)	(0.018)	(0.019)	(0.033)
Through an employment / commercial agency	0.161	0.157***	0.198***	-0.087**	0.042	0.025
	(0.098)	(0.028)	(0.077)	(0.034)	(0.037)	(0.037)
Firm size						
firmsize_1			Reference			
firmsize_2		0.078***	0.090	0.100***	0.139***	0.066***
		(0.020)	(0.058)	(0.016)	(0.025)	(0.024)

[31] Due to the limitation of the number of observations in CHIP 2013, the category of rural-urban migrants who have long term or permanent contracts is set to be a benchmark.

firmsize_3		0.064**	-0.036	0.098***	0.207***	0.094***
		(0.026)	(0.085)	(0.021)	(0.030)	(0.027)
firmsize_4		0.120***	0.147*	0.177***	0.208***	0.127***
		(0.023)	(0.083)	(0.018)	(0.028)	(0.026)
firmsize_5		0.112***	0.224***		0.245***	0.169***
		(0.028)	(0.084)		(0.030)	(0.029)
Constant	0.679***	1.158***	2.136***	0.443***	1.518***	1.850***
	(0.119)	(0.082)	(0.245)	(0.089)	(0.099)	(0.093)
Observations	3,261	6,435	1,173	9,881	6,290	7,815
Adjusted R-squared	0.148	0.235	0.158	0.313	0.402	0.275
*** p<0.01, ** p<0.05, * p<0.1						

Source: Author's elaboration, standard errors in brackets

In Table 5.5, for CHIP 2002, variable *firmsize_1* means firms with less than 100 workers; *firmsize_2* represents firms with 100 to 500 workers; *firmsize_3* represents firms with 500 to 1000 workers; *firmsize_4* represents firms with more than 1000 workers. Due to the differences in the original questionnaires in CHIP, for the rural-urban resident in 2007, the variable *firmsize_1* represents firms with less than 6 workers; *firmsize_2* represents firms with 6 to 49 workers; *firmsize_3* represents firms with 50 to 99 workers; *firmsize_4* represents firms with 101 to 1000 workers; *firmsize_5* represents firms with more than1000 workers. For the rural-urban migrants in 2013 and urban residents in 2007 and 2013, the variable *firmsize_1* represents firms with less than 10 workers; *firmsize_2* represents firms with 11 to 50 workers; *firmsize_3* represents firms with 51 to 100 workers; *firmsize_4* represents firms with 101 to 500 workers; *firmsize_5* represents firms with more than 500 workers.

Judging by the adjusted R-squared statistics and the sign of the estimate, this expanded model performs reasonably well, for the sample of urban residents. The following figure, Figure 5-6, shows the results of the gender wage gap based on the basic model and the extended model between 2002 to 2013.

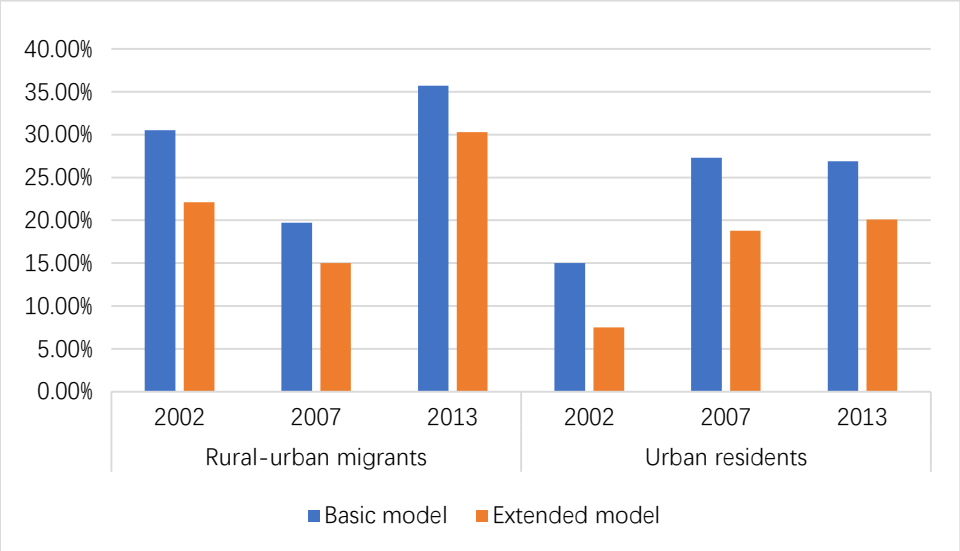

Figure 5-6 Gender wage gap based on the basic model and the extended model

Source: Author's elaboration

When controlling the explanatory variables of employment characteristics, the difference in gender wages of rural-urban migrants declined to 22.1% in 2002 and 15% in 2007, and 30.3% in 2013, respectively. Turning to urban residents, the differentials of wages between men and women had become smaller when controlling the explanatory characteristics of employment. The gender wage gap of urban residents was 7.5% in 2002, 18.8% in 2007 and 20.1% in 2013. These findings are close to the results of past studies by Chen (2011), Li and Xie (2017) and Song et al. (2017).

By controlling the explanatory variables of employment characteristics, the urban *Hukou* did not significantly affect the wages of migrating workers in 2007 and 2013. However, the advantages of workers' wages in East China were significant, except for the migrating group in 2013.

The marginal return rate of one year of educational attainment to wages of migrating workers was about 3% to 4% per year between 2002 and 2013. More precisely, the marginal return rate of the extra year of education on the wages of migrating workers declined from 3.8% in 2002 to 3.2% in 2013. Turning to urban residents, between 2002 and 2013, the average return of one year of education on the wage of workers was about 6.5%.

The estimated coefficients of occupation on wages are shown in Table 5.5. The wage difference between the categories of the occupation of migrating workers is not statistically

significant, but that of urban residents is very significant. Between 2002 to 2013, the salary of the service workers and production workers was about 30% lower on average than that of the manager or director group.

The employment sector has caused a significant difference in wages between Chinese migrant groups and urban groups. The wage gap between wages of migrating workers in the monopoly sectors and those in the competitive industries was 31.6% in 2002, 6.3% in 2007, and 10.6% in 2013. The wage advantage of the monopoly industry is obvious. Turning to urban residents, the differential of wages between competitive industries and monopoly industries was 22.1% in 2002, 9.4% in 2007, and 7% in 2013. It dropped quickly after 2002 but has remained stable since 2007. The wage differentials between workers in the monopoly industry and workers in the public sector were obvious as well.

The types of ownership of firms are introduced in the expanded regression model to control for the related productive characteristics. It significantly affected the wages of urban workers. The foreign-owned enterprises offered much higher wages (over 20%) to their staff than that of government agencies or institutes for the urban residents. Compared with the significant wage differences of workers among different ownership enterprises in 2002, the wage differences between different ownership categories narrowed, and the significance of these differences was not obvious in 2013.

The permanent and long-term contract significantly improved the wages of workers in China. In 2002, migrating workers who had no contract and migrating workers who had a short-term contract received fewer wages than formal migrating staff (working with a permanent contract) by 14.1% and 16.6%, respectively. In 2013, those two indexes were 17.4% and 20.3% for rural-urban residents. In comparison, the wage gap between urban residents having different types of employment contracts was larger. For example, the differential of wages between urban residents with permanent contracts and local workers with no contract was 14.9% in 2002, 44% in 2007 and 31.3% in 2013.

Firm size had a significant effect on the wages of workers between 2002 to 2013 in China. Large size enterprises paid higher average wages for their workers. For example, the average wage of workers in large companies (with more than 100 workers) was more than 10% higher than the average wage of workers in small companies (less than 6 or 10 workers). Company

size and workers' wages show a positive relationship.

Rural-urban migrants who find work through an employment or commercial agency earn significantly more money than workers who find jobs by themselves. This factor did help to increase the wages of migrating workers by 15.7% in 2007, and 19.8% in 2013. The sensitivity of urban residents' wages or how they found their current job is not significant.

5.2.2 Wage Decomposition

The following statistical analysis builds on the extended regression to examine the determinants of the differentials of gender wages for rural-urban migrants and urban residents on the microdata of CHIP 2002, CHIP 2007 and CHIP 2013 with 95% confidence intervals respectively. The results of Blinder-Oaxaca decomposition are presented in the following tables. Following the methodology presented above, Table 5.6 shows the results of the two-fold decomposition of wage differentials between male workers and females in 2002.

Table 5.6 Decomposition of gender wage gap in 2002

	Rural-urban migrants	Urban residents
1: female = 0	2: female = 1	
Log of wage	Coef.	Coef.
Differential		
Prediction_1	.9851***	1.5899***
	(.0155)	(.0089)
Prediction_2	.6985***	1.4000***
	(.0158)	(.0107)
Difference	.2866***	.1898***
	(.0221)	(.0139)
Decomposition		
Explained	.0689***	.1146***
	(.0099)	(.0087)
Unexplained	.2207) ***	.0753***
	(.0217)	(.0124)
Observations	3,261	9,881

Source: Author's elaboration, robust standard errors in brackets, *** p<0.01

Prediction-1 shows the mean of log hourly wage for men and Prediction-2 shows that indicator for women. In 2002, Prediction-1 was about 0.99 for male migrants and Prediction-2 was about 0.70 for females, yielding a wage gap of 0.29. In 2002, about 24% of this differential of gender wage between male migrating workers and females can be explained by the difference in average characteristics (demographic factors, human capital, and employment) in the

Chinese labour market. And the 76% of the difference in log hourly wage between male rural-urban migrants and females was caused by unknown reasons and potential gender discrimination, which was the result of the past study Zhang, 2013).

Considering the results of the two-fold decomposition of wage differentials between male urban residents and females in 2002, the results state that the estimating value of mean log hourly wage is 1.59 for men and that of women is 1.40, yielding a wage gap of about 0.19. The estimate of the coefficient of the explained part of the gender wage gap is about 0.11. Therefore, 60.4% of the differentials of the gender wages of urban residents could be explained by observed variables in 2002. Another 39.6% of all wage differential between men and women may be caused by unobserved variables and gender discrimination.

Table 5.7 reports the results of the two-fold decomposition of wage differentials between male workers and females in 2007.

Table 5.7 Decomposition of gender wage gap in 2007

	Rural-urban migrants	Urban residents
1: female = 0	2: female = 1	
Log of wage	Coef.	Coef.
Differential		
Prediction_1	1.8238***	2.4767***
	(.0088)	(.0115)
Prediction_2	1.6521***	2.2219***
	(.0103)	(.0131)
Difference	.1717***	.2547***
	(.0134)	(.0175)
Decomposition		
Explained	. 0221***	.0668***
	(.0073)	(.0121)
Unexplained	. 1496 ***	.1879***
	(.0125)	(.0148)
Observations	6,435	6,290

Source: Author's elaboration, robust standard errors in brackets, *** p<0.01

In 2007, the difference in log hourly wage between male and female migrating workers was significant. The result of Prediction-1 shows that the mean of log hourly wage is 1.82 for men and Prediction-2 shows the mean of log hourly wage is 1.65 for women, yielding a wage gap of 0.17. About 12.9% of all differential of gender wage can be explained by the difference in personal characteristics between male migrating workers and females. The unexplained part

of the gender wage gap increased to 87.1% in 2007.

The results of the two-fold decomposition of wage differentials between male urban residents and females in 2007 report that the estimated coefficient of the mean of log hourly wage of male urban residents is 2.47 and that of females is 2.21 with a yield of wage gap of 0.25. The explanatory variables explained about 26.3% of all differentials of gender wage in 2007, and 73.7% of the gender wage gap could not be explained by the observed characteristics in this work.

Table 5.8 presents the results of the two-fold decomposition of wage differentials in 2013.

Table 5.8 Decomposition of gender wage gap in 2013

	Rural-urban migrants	Urban residents
1: female = 0	2: female = 1	
Log of wage	Coef.	Coef.
Differential		
Prediction_1	2.5854***	2.7423***
	(.0243)	(.0107)
Prediction_2	2.2459***	2.4996***
	(.0310)	(.0118)
Difference	.3566***	.2426***
	(.03941)	(.0166)
Decomposition		
Explained	. 0366***	.0421***
	(.0178)	(.0095)
Unexplained	.3028***	.2005***
	(.0382)	(.0148)
Observations	1,173	7,815

Source: Author's elaboration, robust standard errors in brackets, *** p<0.01

For rural-urban migrants, the estimated coefficient yield of wage gap between men and women was 0.34 in 2013, while the estimated coefficient of the mean log hourly wage of males was 2.59 and that of females was 2.25. The proportion of unexplained differential of wages between migrating men and women made up 89.7%, while the explained part was 10.3%.

The gender wage gap of urban residents was significant in 2013. The results show that the mean log hourly wage of male urban residents is 2.74 and that of females is 2.50. The estimated value of the difference in gender wage is 0.24. These results indicate that the explanatory variables contributed about 17.4% of the gender wage gap of urban residents and 82.6% of wage differentials between male native workers and females are caused by the potential missing

variables and discrimination against women in the Chinese labour market.

The results of the decomposition of gender wages show that the part of the unexplained gender wage gap has increased rapidly between 2002 to 2013. Unexplained reasons mainly caused the gender wage gap between 2002 to 2013 for both rural-urban migrants and urban residents. Not all differences in gender wages are caused by discrimination. Factors such as human capital, employment, and other unobservable differences in characteristics are also at play. By controlling for the relevant explanatory variables, the decline in the proportion of the explained part of the gender wage gap between 2002 and 2013 indicates to a certain extent that the wage discrimination against women in the Chinese labour market has increased.

Figure 5-7 shows the results as the percentages of the explained part and the unexplained part of the gender wage gap as well as the results of the value of gender wage gap (a ratio of the difference in wage between men and women as a percentage of male wage) in 2002, 2007 and 2013. The left vertical axes show the proportion of the explained part and the unexplained part of wage decomposition that totals up to 100%, and the right vertical axes show the degree of the gender wage gap.

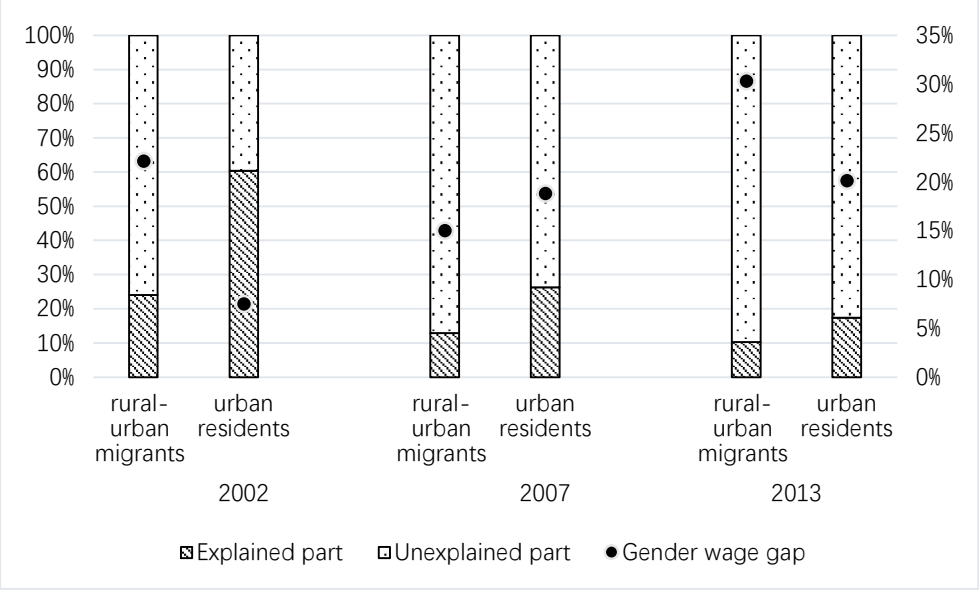

Figure 5-7 Decomposition of gender wage differentials[32]

Source: Author's elaboration

The positive explained part of the difference in the logarithm of hourly wage between men

[32] The difference between male and female log hourly wage is shown as a proportion of the log hourly wage of men.

and women means that men have the overall advantages in the observed characteristics than women. The difference in wages between male migrating workers and females had declined from 2002 to 2007 (from 22% to 15%) and then increased to be 30.3% in 2013. Wage (logarithm of hourly wage) differentials between men and women in the sub-labour market of migrating workers were serious as well as worse.

Turning to urban residents, the raw gender wage gap (logarithm of hourly wage) was 7.5% in 2002 and was not very sizeable. However, the differentials of wages between men and women have been widened significantly after. The gender wage gap of urban residents increased to 18.8% in 2007 and 20.1% in 2013 with statistical significance.

In 2002, about 60% of the entire gender wage gap of urban residents could be explained by the observed variables, and that potential gender discrimination in the Chinese urban residents' labour market was not obvious. This result is higher than the finding from Song et al. (2017) but closer to the finding by Zhao et al. (2019). From 2002 to 2013, both for the rural-urban migrants and urban residents, the proportion of the explained part of the gender wage gap of workers declined. The results show that from 2002 to 2007, the proportion of the explained part of the gender wage gap declined rapidly. After 2007, the change in the share of explained differentials of gender wage narrowed, which was about 26.3% in 2007 and 17.4% in 2013. This is close to the previous study by Song et al. (2017).

In comparison, the influence of observed factors on the gender wage gap (the proportion of the explained part) of rural-urban migrants was less than that of urban residents by about 50% in the same observed years. For example, the proportion of the explained part accounted for 12.9% of all gender wage differential of migrating workers, a ratio that was 26.3% for urban residents in 2007.

The characteristics of the demographic, human capital, and personal employment contribute more to the differences in wages between men and women for urban residents than the migrating workers in the Chinese labour market. The results state that unobserved variables and discrimination against women in the labour market dominated the differences in wages between men and women between 2002 to 2013, except for urban workers in 2002.

5.2.3 Results of Quantile Regression

The standard regression of the Mincer Earnings Function tests the relations between the

individual characteristics and wage based on the conditional mean. The quantile regression provides a description of the coefficient estimates of the explanatory variables in the regression model at every point in the conditional distribution of the dependent variable. A previous study states that "the wage gap increases with the pay scale" (Hernandez et al., 2001). Similar results are reported not only by Wang (2010) but also Ge and Zeng (2011) in China.

The following tables report the coefficient results of the selected explanatory variables at the point of 10%, 50%, and 90% of the entire distribution of the logarithm of hourly wage with the statistical significance.[33] Table 5.9 displays the gender wage gap at quantiles of wage distributions in 2002.

Table 5.9 Gender wage gap at quantiles (0.1, 0.5 and 0.9) in 2002

Variable	Rural-urban migrants			Urban residents		
	Q10	Q50	Q90	Q10	Q50	Q90
Female	-0.180***	-0.216***	-0.295***	-0.109***	-0.065***	-0.034
	(0.038)	(0.027)	(0.048)	(0.022)	(0.014)	(0.022)
Observations	3,261			9,881		

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: Author's elaboration

The differentials of wages between men and women were distributed unequally across the wage distribution in 2002. The wage gap between men and women increased with the rising wage for rural-urban migrants. Turning to urban residents, the gender wage gap was larger at the bottom of the wage distribution and kept narrowing across the whole wage distribution in 2002.

Table 5.10 displays the gender wage gap at quantiles of wage distributions in 2007.

Table 5.10 Gender wage gap at quantiles (0.1, 0.5 and 0.9) in 2007

Variable	Rural-urban migrants			Urban residents		
	Q10	Q50	Q90	Q10	Q50	Q90
Female	-0.077***	-0.131***	-0.203***	-0.134***	-0.199***	-0.186***
	(0.019)	(0.015)	(0.022)	(0.023)	(0.017)	(0.028)
Observations	6,435			6,290		

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: Author's elaboration

In 2007, the gender wage gap of rural-urban migrants increased when moving towards the

[33] The details of results based on the method of quantile regression are reported in the Appendix section.

top end of the wage distribution. For example, the gender wage gap was 7.7% at quantile points 0.1 and it was 20.3% at quantile points 0.9 for rural-urban migrants. In 2007, low-income female workers had more equality in the gender wage than high-income workers for local natives.

Table 5.11 displays the gender wage gap at quantiles of wage distributions in 2013.

Table 5.11 Gender wage gap at quantiles (0.1, 0.5 and 0.9) in 2013

Variable	Rural-urban migrants			Urban residents		
	Q10	Q50	Q90	Q10	Q50	Q90
Female	-0.302***	-0.301***	-0.251***	-0.226***	-0.185***	-0.199***
	(0.098)	(0.042)	(0.060)	(0.028)	(0.014)	(0.023)
Observations	1,173			7,815		

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: author calculation

In 2013, the effects of gender on the individual wage fluctuated across the whole wage distribution both for rural-urban migrants and urban residents. Low-income female local natives suffered more inequality in the gender wage in 2013. Similar results were found for migrating workers.

Table 5.12 displays the results of estimated the return of education on wage at quantiles of wage distributions in 2002.

Table 5.12 Estimated results of education on wage at quantiles (0.1, 0.5 and 0.9) in 2002

Variable	Rural-urban migrants			Urban residents		
	Q10	Q50	Q90	Q10	Q50	Q90
Education in years	0.019***	0.032***	0.060***	0.057***	0.064***	0.064***
	(0.008)	(0.006)	(0.011)	(0.005)	(0.004)	(0.005)
Observations	3,261			9,881		

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: Author's elaboration

Starting with the rural-urban migrants' group, the returns of education on wage increase significantly when moving towards the top of the wage distribution. Education benefitted the richer of rural-urban migrants more in 2002. The educational return on wages of urban workers showed the same trend, but the range was smaller.

Table 5.13 displays the results of estimated the return of education on wage at quantiles of wage distributions in 2007.

Table 5.13 Estimated results of education on wage at quantiles (0.1, 0.5 and 0.9) in 2007

Variable	Rural-urban migrants			Urban residents		
	Q10	Q50	Q90	Q10	Q50	Q90
Education in years	0.031***	0.043***	0.052***	0.059***	0.070***	0.069***
	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)
Observations	6,435			6,290		

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: Author's elaboration

In 2007, the marginal return of education on the wage of migrating workers increased with the wage distribution curve (rose over 2% when moving from the bottom of wage distribution to the top). The contribution of education on the wage of urban residents fluctuated at quantiles of the wage distribution.

Table 5.14 reports the results of estimated the return of education on wage at quantiles of wage distributions in 2013.

Table 5.14 Estimated results of education on wage at quantiles (0.1, 0.5 and 0.9) in 2013

Variable	Rural-urban migrants			Urban residents		
	Q10	Q50	Q90	Q10	Q50	Q90
Education in years	0.035	0.026*	0.058**	0.067***	0.065***	0.075***
	(0.023)	(0.010)	(0.014)	(0.007)	(0.003)	(0.005)
Observations	1,173			7,815		

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: Author's elaboration

In 2013, education contributed more to the wage of high-income workers for rural-urban migrants. Turning to urban residents, this ratio shows a relatively stable trend in the entire wage distribution. More results for the quantile regression of gender wage differentials for rural-urban migrants and urban residents between 2002 to 2013 are shown in tables in the Appendix.

The results illustrate that the effects of explanatory variables are different over quantiles across the wage distribution. For example, the high-income group of migrant workers in the public industry had more advantages in wages in 2002. Turning to urban residents, the regional factor shows more effects on wages for rich workers. In comparison, the changes in the coefficients of the explanatory variables with statistical significance at the different quantile points of the logarithm of the hourly wage for urban residents are more obvious. The gap between company groups by types of ownership decreased when moving up to the top of wage

distribution except for foreign-owned companies. The differential of wages between workers in foreign-owned companies and the benchmark rose significantly when moving from the bottom to the top end of the wage distribution in 2002. The impact of enterprise size on urban residents' wages decreases as the distribution of wages shifts to the right.

More tables are shown in the Appendix section. They provide the details of coefficients of the explanatory variables based on the quantile regression method. The doctoral dissertation no longer describes in detail the coefficient changes of each explanatory variable in the entire wage distribution.

CHAPTER 6 CONCLUSIONS

6.1 Conclusions and policy implications

With the rapid development of the Chinese economy in the last few decades, inequality in gender earnings has become a serious and persistent problem.

The first task of the doctoral dissertation was to estimate the effects of the explanatory variables such as human capital, demographic, and employment of workers on the wages of rural-urban migrants and urban residents, respectively. This doctoral dissertation used the expanded Mincer Earnings Function to test the coefficients of explanatory variables that affect the individual wage. This work applied two approaches including Ordinary Least Squares in the mean value of the logarithm of hourly wage and Quantile Regression focusing on the entire wage distribution to investigate the role of individual characteristics in workers' wages.

The second task of the doctoral dissertation was to have a comparative study on the difference in gender wages for rural-urban migrants and urban residents in China. It used the classical Blinder-Oaxaca decomposition to analyse the difference in wage between the male and female workers for rural-urban migrants and urban residents separately.

This doctoral dissertation employed the microdata of CHIP 2002, CHIP 2007 and CHIP 2013, selecting and designing the same explanatory variables to figure out the difference in wage determinations in two sub-labour markets in China.

It differed from the previous analysis on this topic in two respects. First, under the same research framework, this work investigates the wage decisions and gender wage differences of rural-urban migrants and urban residents separately from 2002 to 2013 that spanned a decade. Secondly, it selects and sets the same explanatory variables from different sub-surveys to compare the difference in the wage determinants and gender wage gap between rural-urban migrants and urban residents.

The results of this work prove some common understandings, such as women having lower wages than men (Ding et al., 2012; Song et al.,2017); therefore, the problem of the wage difference between men and women in China becomes prominent. The overall mean wage of the rural-urban migrants is lower than that of urban residents in China (Zhang, 2013; Sun, 2017; Rush, 2011). In China, geographical factors affect the wages of workers greatly. Working in

Eastern China can greatly increase workers' wages. With China's economic reforms and privatisation, the income distribution gap among urban residents has widened. Due to the fragmented job market and some low-income groups having low levels of education and poor job security, there are existing groups with lower income objectivity (Wang, 2007).

The differentials of wages between male migrating workers and females were sizeable in 2002 and rose to the highest level in 2013. Turning to the gender differences in the entire wage distribution, results show that the gender-based wage difference was higher at the end of wage distribution for rural-urban migrants in 2002 and 2007, as the results from Wang (2010) and Ge and Zeng (2011) showed. In 2013, the results showed that the highest gender wage gap is at the bottom of the wage distribution for migrating workers.

Turning to urban residents, the regression results prove that the gender wage gap (logarithm of hourly wage) was visible. It had widened for urban residents between 2002 and 2007, and then remained stable after 2007. These results are similar to previous works completed by Chen (2011), Ding et al. (2012), Song et al. (2017) and Zhao et al. (2019). They pointed out that the gender wage gap and gender discrimination in the urban labour market in China have been reversed, and that gender discrimination has made more contributions to the gender wage gap. The result shows that the gender differences in wages of urban residents decreased from the bottom to the top end of the wage distribution in 2002 and 2013. That means that the female workers with low income have more wage inequality in the labour market. However, the differentials of wages between male urban residents and female residents increased when wages rose in 2007. Females with low-income had more equality of gender wage.

The age structure of rural-urban migrants changed between 2002 and 2013, as a consequence caused by the aging population. After 2007, the median age of labourers in the rural-urban migrants' groups increased significantly. In comparison, the age structure of urban residents showed a stable trend over time. The age factor has a positive contribution to individual wages in the early stages of a personal career. With the reform and privatisation of the Chinese economy, the effects of age on individual wages have changed significantly. The seniors had lost their advantage in wages gradually from 2002 to 2013, typically for urban residents. Turning to rural-urban migrants, the peak of the wage-age curve has moved right.

The urban *Hukou* improved the wages of workers for both migrating workers and local natives in 2002. However, the influence of that factor on workers' wages has declined later on. These results are in line with the conclusions of previous studies; for instance, those of Weng (2016), along with Ramirez and Moon (2018).

In 2002, the difference in workers' earnings between West China and other regions was proven. The mean wage of workers in West China was less than that in Middle China and East China for rural-urban migrants. This difference in wages has caused the mobility of labourers from western China to eastern China since 2000. In 2013, the difference in wages between West China and Middle China has declined significantly. The policy of "the development of the western region in China"[34] shows its influence.

The coefficients of education positively contribute to the wage of workers significantly in this thesis, as the results are shown in past research from Yue (2004), Liu (2008), He and Wu (2014), Park and Qu (2013), Yang and Wang (2015), and Su and Heshmati (2015). The returns from high education, including the education of undergraduate and postgraduate to the wages, are remarkable. From 2002 to 2013, the contribution of various educational qualifications to the wages of workers in the Chinese labour market gradually declined. Even a low level of education, such as the middle junior school, increased the individual wages significantly at the beginning of this century; however, that became less later on. These results show the impact of expanding the scale of Chinese higher education on the wages of workers.

In comparison, the impact of education on personal wages was more obvious for urban residents during the same period in China. For example, the average marginal return rate of the one year of education on wages of migrating workers was about 3.5% and that of urban residents was about 6.5% between 2002 and 2013. For both rural-urban migrants and urban residents, education contributes more to workers with high-incomes, which echoes the previous study results from Qian and Jiang (2011).

The results report that the number of employed people in the private sector and individual enterprises have grown rapidly, especially among urban residents. It caused an increase in

[34] The development of the western region in China was started in 2000, with the main purpose of the policy being to improve the social and economic development in western China and to balance the regional development in China.

informal sector employment in the Chinese labour market. The differences in worker's wages between the categories of employment contract (for example, permanent contract, long-term contract, short-term contract, etc.) are sizeable and significant. Formal employment (permanent contract) means higher wages, as the results stated by Luo (2008), Park and Qu (2013) and He and Wu (2014) stated, especially for urban residents. The increasing size of the private economy improves the equality in wages between industries.

Employment occupation is an important factor in determining the wages of workers. The finding in this thesis proved that wage gaps between various occupations are obvious, especially for urban residents. In fact, the differences in wages between occupations reflect the differences in productivity and human capability required in related occupations. Another finding is that the wage gaps between the monopoly industry and other industries are declining for both rural-urban migrants and urban residents. This result shows the impact of economic reforms on the labour market.

A new and enlightening finding is that the employment agencies or commercial intermediaries in the labour market help to improve the individual wage of rural-urban migrants. The intervention of market forces can improve the fairness and efficiency of the labour market.

The gender wage gap of rural-urban migrants decreased between 2002 and 2007, but also increased between 2007 and 2013, while the gender gap of urban migrants kept increasing. In comparison, the rural-urban migrants had a larger gender wage gap than urban residents between 2002 and 2013. Migrating women faced more inequalities in gender wages than local women. An important finding of this thesis is that between 2002 and 2013, the explainable part of the gender wage gap between rural migrants and urban residents decreased, while the proportion of the explanatory part of urban residents' wage decomposition declined faster. Moreover, the share of the unexplained part of wage decomposition of urban residents was higher than that of migrants in 2002, 2007 and 2013, respectively. In 2013, most of the wage differentials of migrating workers were unexplained. These indicate that discrimination against women in the Chinese labour market has increased. Women workers in the sub- labour market of migrants suffer more wage discrimination.

In this thesis, the observed differences in human capital and personal employment characteristics have a greater impact on the difference in hourly wages between men and women

in urban residents. The results showed that workers' personal factors, human capital, and employment factors have a greater contribution to determining the wages of urban residents in the Chinese labour market. This shows that the labour market is isolated. Individual human capital investment and employment factors are more efficient in wage determination in the sub-labour market of urban residents. At the same time, this shows that the factors that determine the wages of migrant workers should include more potential and unobservable factors. In China, the wage mechanism that determines the labour market for migrant workers and the labour market for urban residents is different.

As for the decomposition result of the wage difference between men and women, the explained part of the decomposition of the gender wage gap decreased significantly for both urban residents and rural-urban migrants. In 2002, about 60% of wage differentials between men and women of urban residents could not be explained by the observed characteristics' difference between gender groups. In 2013, the share of this explained part was only 17.4% for urban residents. For rural-urban migrants, there are more potential, unobserved factors affecting gender wage differences. In 2002, the biggest part of the gender wage gap (over 75%) could not be explained. In 2013, there was about 10% of this difference in gender wage was explainable. In fact, there are different factors affecting workers' wages, and some factors are difficult to measure or determine, such as discrimination in the labour market. The rapidly rising unexplained part of gender wage reveals an increase in gender wage discrimination.

From the perspective of public policy, the following are suggestions for the Chinese government.

Education improves the equality of wages significantly in China. The rapid increase in the number of workers having a junior college degree and higher degree produces massive changes in China's labour market. More education ensures a higher wage for rural-urban residents and urban residents. Turning to the migrating workers, the proportion of workers who have high education or specialised secondary school and technical school education is much less than that of urban residents. The priority task is to guarantee the education of residents in rural areas and less developed areas in China. The improvement of education will improve the equality of wages in the Chinese labour market.

It is undeniable that with the aging of the population and the expansion of the scale of

higher education, the increase in the supply of China's younger workers of labour will decline. The increase in education investment attracts some rural residents to study instead of work in the city. As a result, the supply of rural-urban migrants will decline. The reduction of young workers pushes up labour costs, especially the cost of migrating workers. The lack of low-skill or low-education workers is pushing up the wages of Chinese workers. Therefore, local governments must balance the labour structure to ensure sustainable development.

Moreover, the government should recognise the difference between the two sub-labour markets and structure the labour market policy precisely to avoid the risk of oversimplification in applying the relevant labour market policy in China. Considering the difference in the gender wage gap between rural-urban migrants and urban residents, the urban *Hukou* shows the limited influence on the wage of workers. Relying on the relaxation of household registration control alone cannot solve the problem of the urban-rural income gap. The suggestion is to reduce market entry barriers, eliminate the isolation of the sub-labour markets and promote the integration of the two sub labour markets. It is an efficient way to decrease the overall gender wage gap.

The government should pay attention to the differences in the impact of various factors on workers' wages in the wage determination process between rural-urban migrants and urban residents. The policy should be more precise and focus on the target sub-labour market or labourers' group by the special group instead of ignoring the difference between the labour groups. For example, social networks and employment background are different between the migrating workers and local natives. The government should encourage the development of commercial employment agencies in the sub-labour market of rural-urban residents. That will significantly improve the wages of migrating workers in the city by helping the migrants to access some employment opportunities.

The proportion of urban residents working in the formal sector is much higher than that of urban-rural migrants. Formal employment is conducive to improve personal wages. The government should effectively provide policy protection to workers, especially urban and rural migrants, to ensure that workers sign formal labour contracts and have the necessary social benefits. Considering the segmentation of occupation and industry, it is necessary to change professional female work roles and eliminate the barriers of employment for female workers as

well as providing more opportunities to women at more high-level and high-paying jobs

Pay transparency provides the information to monitor or reduce the discrimination of wages for equal work of employees in the same company or institute. Labour policy should focus on improving the transparency of payment especially in private sectors or for rural-urban migrants. It helps to improve the equality of wages.

The increasing of unexplained part of the gender wage decomposition results requires figuring out the potential causes in the labour market. It is the basal step to improve earning equity. Also, not all differences in wages by gender are caused by discrimination; it is necessary to examine and observe the discrimination in wages against women with some specially designed surveys. Although China has some labour market databases, these data cannot reflect the operation of the labour market in a timely manner. Compared with labour markets in other developed countries, China needs to establish an information collection system to compile statistics on individual wages and wage gaps between groups, and report data on time, such as monthly or quarterly. It is necessary to distinguish between migrating workers and urban workers in the same area. By designing and using different systems separately, data can be collected effectively. With the help of new network technologies, this work can be started in developed cities in China, such as Beijing and Shenzhen.

Most counties in the European Union have the legislative framework aimed at the equality of pay for men and women (Foubert, 2018). To get the equality of pay and employment opportunities for women, it is necessary to establish a government agency to observe and record gender discrimination in the Chinese labour market.

Although in the process of implementing laws and regulations, some regions and industries are still very inefficient, formulating policies is still the government's primary task. At the same time, the government should give the labour inspection department greater powers to ensure the implementation of labour market laws and policies. This is not a task that can be completed in the short term, it requires long-term changes and efforts.

The gender difference in human capital in the labour market is real. Men and women have the physical and objective difference in the capability of social work and housework. The absolute equality of wages between men and women is hard to achieve.

The research on the Chinese labour market has shifted from researching the entire labour

market to researching market segmentation and the dual-labour market of China. Until today, the segmentation of the urban and rural labour market is the most prominent problem in the development of China's labour market. Accelerating the integration of urban and rural labour markets and realising a unified labour market in China is the primary issue. However, due to many historical, social, and institutional reasons, this problem will exist for a long time.

6.2 Limitations and future research

In recent decades, the Chinese labour market has developed rapidly. However, the market-oriented reform of China's labour market has a short history. Due to the large population of China, there is no data or sample that can comprehensively and completely summarise the entire situation of the Chinese labour market. There is a lack of official statistics on the employment situation of the migrating workers in China. In addition, the potential factors affecting workers' wages are very complex, and many factors are unobservable. As mentioned in Section 4.1.1, CHIP is currently the best and the latest data, but it is hard to represent the whole situation in the Chinese labour market. However, CHIP does provide the cross-sectional data and it is hard to prove the causality between the gender gap and related factors. Due to the relatively inadequate data on rural-urban migrants observed in CHIP 2013, the results related to this group may be limited.

The theories and models of wage determination and gender discrimination are very rich. This dissertation only uses the classical method of Mincer Earnings Function and carries out the Blinder-Oaxaca decomposition to examine the gender wage gap for full-time employed workers in China to describe the picture of the gender wage gap for rural-urban migrants and urban residents separately.

There are, however, some interesting tasks based on the contribution of this dissertation.

One, with the aging process in China, the aging population changed the structure of the Chinese labour market. A study that focuses on the shortage of young workers and is related to determining wages should be attractive, especially on the issue of the rural-urban migrants. Since NBSC does not provide the detailed employment and personal information about migrant workers in urban and rural areas, researchers need to design and conduct targeted and representative surveys to obtain the required data.

Two, the degree of the gender wage gap is different between rural-urban migrants and

urban residents. Are there some potential factors leading to this difference, such as some undiscovered social factors or labour market factors? Further research should investigate the potential reasons that caused the gender wage gap more precisely and figure out the difference in mechanism in these sub-markets. First, a special survey is necessary to obtain data on labour wages, human capital, and other aspects. Second, the best source of data should be employers rather than employees to avoid some subjective omissions. Third, research can choose an industry that is easy to carry out labour wage analysis and comparison, and it does not need to cover all industries.

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CHAPTER 8 LIST OF TABLES

CHAPTER 9 LIST OF FIGURES

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APPENDIX

Table 10.1 Previous studies on wage gap and gender wage gap in the Chinese labour market

	Data	Sample	Main findings	Methodology
Liu et al., 2000	Independent survey in 1996 and 1995	Urban workers and rural-urban migrants	Compared with gender discrimination, the privatisation caused more increase in gender wage gap.	Mincer earning equations, Oaxaca-Blinder Decomposition
Gustafsson and Li, 2000	Urban Household Income Surveys 1989, 1996	Urban household	The average gender earnings gap in urban China appeared to be relatively small, but it has increased between 1988 and 1995.	Mincer earnings equations Oaxaca decomposition
Rozelle et al., 2002	Independent survey in 1985 and 1995	Rural residents	The gender wage gap was sizeable between 1985 and 1995, while reform policies and market competition showed no impact on wage discrimination.	Oaxaca decomposition
Xing, 2005	CHNS (1991,1993, 1997)	Not mentioned	The state-owned sector and the private sector's wage decisions are different over time.	Quantile regression
Demurger et al., 2007	CHIP 1998, 2005	Urban residents	The stability of the gender wage gap between 1988 and 1995 in urban China was caused by a complex set of factors. The reform decreased the discrimination in the private sector and relaxing rules increased the discrimination in the state-owned sector.	Oaxaca decomposition
Li and Dong, 2008	Independent survey in 2002	Urban residents	Firms' factors play a very important role in the gender wage gap. The external market environment and internal institutional factors are important factors for gender wage gap.	Mincer earnings equations with method of Weighted Least Squares Regression
Wang and Cai, 2008	CULS[35]	Urban household	The main source of fewer earnings for women is due to	Brown's decomposition

[35] CULS - China Urban Labour Survey

			the unequal pay within sectors, and gender discrimination was the main reason for the gender wage gap, not the different human capital characteristics between men and women.	
Duan and Chen, 2009	CGSS 2004	Urban residents and rural-urban migrants	The per capita of urban households was generally higher than that of rural households, and various influencing factors played the different roles in households with different income levels.	Quantile regression
Yin and Gan, 2009	CHNS (1989 to 2006)	Not mentioned	Between 1989 and 2006, the wage differential between the public sector and the nonpublic sector changed.	Mincer Earning Function, Heckmen two-step method
Xing, 2010	CHIP 2002	Rural-urban migrants	*Hukou* affected the wage of workers positively and significantly, education pushed the worker migration from the rural areas to the urban areas.	Counterfactual analysis
Chen and Hamori, 2010	CHNS (2004,2006)	Urban resident	The difference in the characteristics between formal and informal employment accounted for the main part of the gender wage differential, the discrimination against women was significant.	Heckmen two-step method Oaxaca decomposition
Xu, 2010	CHNS (1991,1993, 2004,2006)	Not mentioned	Change in the return rate of education was the main reason for the increase in income inequality in China.	General Equilibrium Model
Ge and Zeng, 2011	Urban Household Income Surveys 2000	Urban household	The gender wage gap at the end of the wage distribution was larger. The gender wage gap at the top of the wage distribution was smaller, that of low-income groups was worse.	Quantile regression, Counterfactual analysis
Chen, 2011	CHNS (1989 to 2009)	Not mentioned	Gender wage gap had increased dramatically from	Mincer Earning

			1989 to 2009, women had the largest wage gap in the private sector.	Function, Oaxaca-Blinder decomposition
Qian and Jiang, 2011	Independent survey	Rural-urban migrants	When moving from the bottom to the top of the wage distribution, the gender wage gap has increased, while the degree of gender discrimination decreased.	Quantile regression, Oaxaca-Blinder decomposition
Deng and Ding, 2012	CFPS 2010	Not mentioned	The gender difference in the industry distribution of male and female workers is the main reason for the gender income gap.	Hierarchical Linear Models
Liu and Li, 2012	CHIP 2002	Urban residents	Trade liberalisation has widened the gender wage gap in general, the opening process narrowed the gender wage gap for high-skilled labor and widened the gender wage gap for low-skilled labor.	Mincer Earning Function
Zhang, 2013	Independent survey	Rural-urban migrants	There is a significant difference in gender wages for migrating workers, and women migrants have fewer wage than men, three-fourth of the gender wage gap cannot be explained.	Mincer Earning Function, Oaxaca-Blinder decomposition
Chi and Li, 2014	China Urban Household Surveys 1988 to 2009	Urban household	The different employment selectivity between men and women has impact on gender wage gap.	Heckman two-step method
Su and Heshmati, 2015	CFPS 2009	Not mentioned	Male workers generally have a higher wage than female workers, and main part of the difference is unexplained.	Oaxaca decomposition with different weighting systems
Zhao, 2016	CGSS 2013	Urban residents and rural-urban migrants	Wage differential between migrants and urban residents is mainly caused by the characteristics of human capital and employment. For	Heckman two-step method, Extended Mincer Earning

			migrants, the occupation discrimination was obvious.	Function
Zhang et al., 2016	CHIP 2007	Urban residents and rural-urban migrants	The wage of urban residents and rural-urban residents is significant different, the characteristics of human capital and employment dominated the that gap.	Heckman two-step method Oaxaca-Blinder Decomposition
Ma, 2017	CHIP2013	Urban residents	Compared with the influence of inter-sector differentials, the influence of intra-sector differentials on the gender wage gap was greater.	Brown decomposition
Song et al., 2017	CHIP1995, 2002,2007, 2013	Urban residents	The gender wage gap for urban residents had widened between 1995 and 2007. It narrowed from 2007 to 2013, the unexplained part of the difference in gender wage gap declined over time.	Mincer earnings equations using ordinary least squares (OLS), Oaxaca decomposition
Fang and Huang, 2017	CHIP1995, 2013	Urban residents	The expanded scale of high education did not decrease the higher education return to workers' wage, the return on higher education had increased.	Mincer Earning Function, Heckman two-step method
Ramirez and Moon, 2018	CHNS (1993 to 2011)	Not mentioned	The wage premium of urban *Hukou* is limited.	Extended Mincer earning equations
Zhao et al., 2019	CHIP1995, 2002,2007, 2013	Urban household	The gender wage gap and discrimination in the urban labor market have reversed and then changed in the same direction. Gender discrimination showed more contribution to the gender wage gap over time.	Heckman two-step method Oaxaca decomposition -Neumark

Source: Author collation

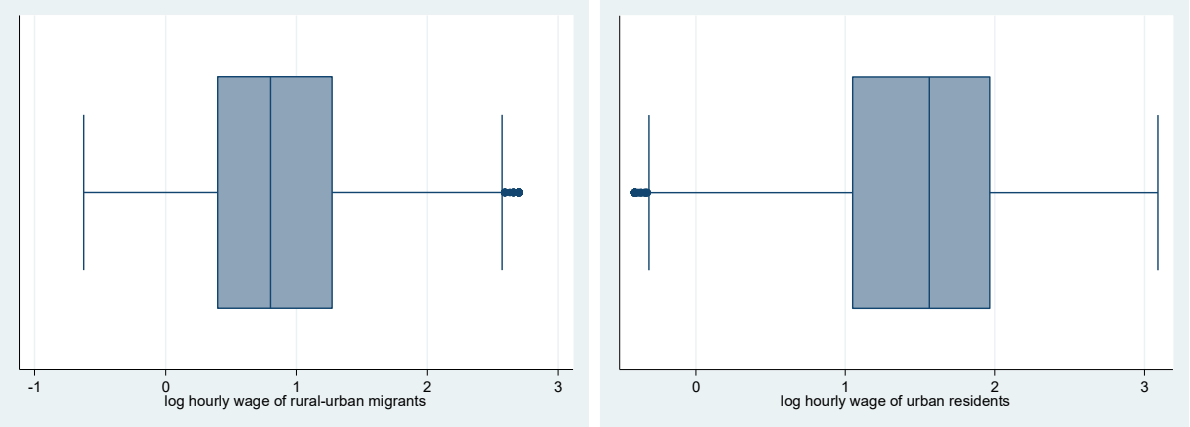

Figure 10-1 Box plots of logarithm of the hourly wage of migrants and urban residents in 2002

Source: Author's elaboration

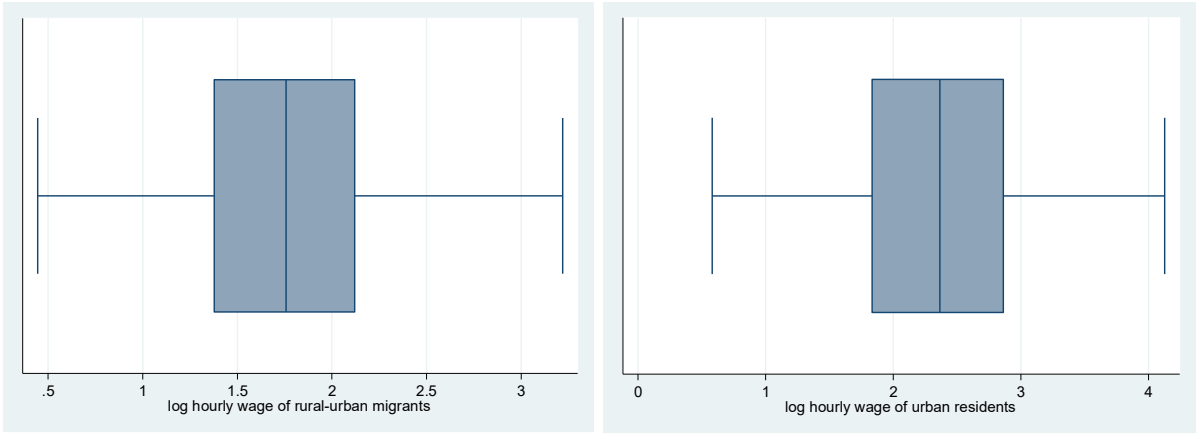

Figure 10-2 Box plots of logarithm of the hourly wage of migrants and urban residents in 2007

Source: Author's elaboration

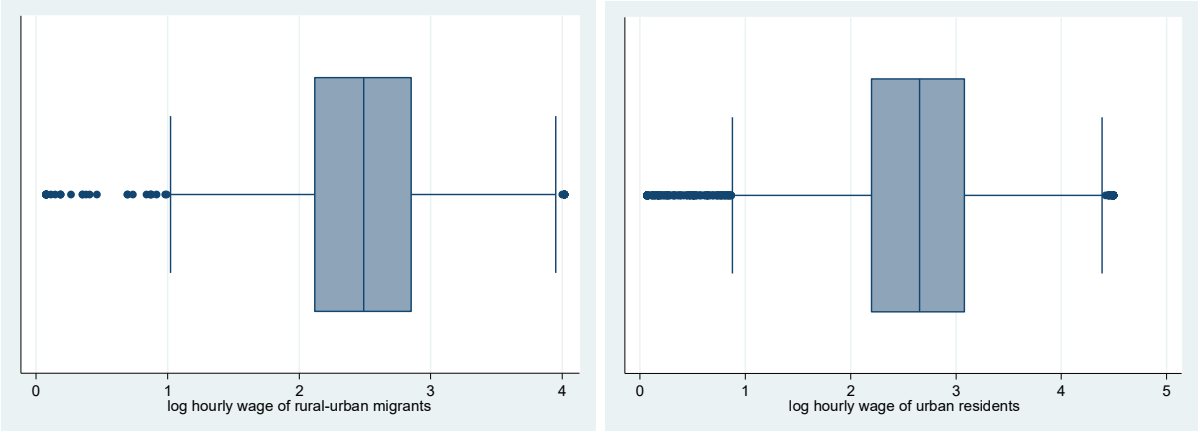

Figure 10-3 Box plots of logarithm of the hourly wage of migrants and urban residents in 2013

Source: Author's elaboration

Table 10.2 Result of quantile regression for rural-urban migrants and urban residents in 2002

	rural-urban migrants			urban residents		
VARIABLES	Q10	Q50	Q90	Q10	Q50	Q90
Female	-0.180***	-0.216***	-0.295***	-0.109***	-0.065***	-0.034
	(0.038)	(0.027)	(0.048)	(0.022)	(0.014)	(0.022)
Middle China	0.136***	0.147***	0.106*	0.075***	0.110***	0.295***
	(0.050)	(0.036)	(0.063)	(0.029)	(0.019)	(0.029)
East China	0.069	0.195***	0.180***	0.021	0.060***	0.159***
	(0.045)	(0.032)	(0.056)	(0.025)	(0.016)	(0.025)
Urban *Hukou*	-0.020	0.135*	0.274**	0.280***	0.284***	0.205**
	(0.111)	(0.079)	(0.140)	(0.087)	(0.056)	(0.086)
Han	-0.045	0.044	-0.017	-0.160***	-0.054	-0.044
	(0.066)	(0.047)	(0.083)	(0.053)	(0.034)	(0.052)
Married	0.164*	0.136**	-0.023	0.065	-0.006	-0.046
	(0.084)	(0.060)	(0.106)	(0.050)	(0.032)	(0.050)
Divorced/Widowed	0.502***	0.264*	0.060	-0.022	0.010	-0.136
	(0.189)	(0.135)	(0.237)	(0.093)	(0.060)	(0.092)
Education in years	0.019**	0.032***	0.060***	0.057***	0.064***	0.064***
	(0.008)	(0.006)	(0.011)	(0.005)	(0.004)	(0.005)
Experience in years	0.015	0.011	0.020*	0.036***	0.022***	0.022***
	(0.009)	(0.006)	(0.011)	(0.005)	(0.004)	(0.005)
(Exp_sq2)/100	-0.048***	-0.033**	-0.042*	-0.050***	-0.014*	-0.013
	(0.018)	(0.013)	(0.023)	(0.011)	(0.007)	(0.011)
Technic staff	0.090	0.283***	0.057	-0.018	0.041	-0.048
	(0.108)	(0.077)	(0.136)	(0.039)	(0.025)	(0.039)
Clerk	0.059	0.204**	0.065	-0.092**	-0.044*	-0.162***
	(0.135)	(0.096)	(0.170)	(0.040)	(0.026)	(0.040)
Service worker	-0.093	0.036	-0.181**	-0.385***	-0.267***	-0.375***
	(0.057)	(0.041)	(0.072)	(0.050)	(0.032)	(0.050)
Production worker	0.308***	0.293***	0.180	-0.229***	-0.130***	-0.276***
	(0.091)	(0.065)	(0.114)	(0.042)	(0.027)	(0.042)
Others	-0.164*	-0.061	-0.175	-0.496***	-0.345***	-0.335***
	(0.092)	(0.065)	(0.115)	(0.061)	(0.039)	(0.061)
Competitive	-0.418***	-0.279***	-0.378***	-0.278***	-0.243***	-0.163***
	(0.101)	(0.072)	(0.128)	(0.041)	(0.027)	(0.041)
Public	-0.232*	-0.305***	-0.403**	0.001	-0.044	-0.054
	(0.134)	(0.096)	(0.169)	(0.042)	(0.027)	(0.042)
Others	-0.330***	-0.216***	-0.401***	-0.210***	-0.217***	-0.194***
	(0.100)	(0.072)	(0.126)	(0.033)	(0.021)	(0.033)
State-owned				-0.163***	-0.116***	-0.044
				(0.036)	(0.023)	(0.036)
Collective-owned	0.033	0.016	0.075	-0.343***	-0.319***	-0.170***
	(0.119)	(0.085)	(0.150)	(0.050)	(0.032)	(0.050)
Private-owned	0.009	0.009	0.123	-0.205***	-0.190***	-0.108***

	(0.086)	(0.061)	(0.108)	(0.040)	(0.026)	(0.040)
Foreign owned	-0.076	0.343*	0.302	0.146*	0.249***	0.341***
	(0.257)	(0.184)	(0.324)	(0.077)	(0.050)	(0.077)
Others	-0.176*	-0.077	0.010	-0.203***	-0.160***	-0.005
	(0.106)	(0.075)	(0.133)	(0.074)	(0.048)	(0.074)
Long-term				0.009	0.013	0.099***
				(0.029)	(0.019)	(0.029)
Short-term/ temporary	-0.120	-0.177***	-0.127	-0.181***	-0.040	0.069*
	(0.090)	(0.064)	(0.113)	(0.039)	(0.025)	(0.039)
No contract	-0.115	-0.128*	-0.114	-0.213***	-0.154***	-0.122***
	(0.104)	(0.074)	(0.131)	(0.046)	(0.030)	(0.046)
Others	-0.058	-0.043	-0.052	-0.138*	-0.019	0.141*
	(0.154)	(0.110)	(0.193)	(0.078)	(0.050)	(0.078)
Through a referral by friend or family	-0.063	-0.009	0.035	-0.084**	0.011	0.056
	(0.051)	(0.037)	(0.064)	(0.042)	(0.027)	(0.042)
Assigned by the government or through an open examination	0.165	0.063	0.178	0.054*	0.032	-0.074**
	(0.353)	(0.252)	(0.443)	(0.031)	(0.020)	(0.031)
Through an employment / commercial agency	0.306	0.187	0.215	-0.042	-0.077**	-0.199***
	(0.186)	(0.133)	(0.234)	(0.060)	(0.039)	(0.060)
Others	-0.016	0.050	0.204***	-0.103**	-0.021	-0.041
	(0.050)	(0.035)	(0.062)	(0.041)	(0.026)	(0.041)
firmsize_2				0.132***	0.094***	0.056**
				(0.027)	(0.018)	(0.027)
firmsize_3				0.143***	0.080***	0.030
				(0.038)	(0.025)	(0.038)
firmsize_4				0.247***	0.176***	0.111***
				(0.032)	(0.021)	(0.032)
Constant	0.298	0.605***	1.314***	-0.197	0.343***	1.119***
	(0.210)	(0.150)	(0.264)	(0.143)	(0.092)	(0.143)
Observations	3,261	3,261	3,261	9,881	9,881	9,881

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10.3 Result of quantile regression for rural-urban migrants and urban residents in 2007

	rural-urban migrants			urban residents		
VARIABLES	Q10	Q50	Q90	Q10	Q50	Q90
Female	-0.077***	-0.131***	-0.203***	-0.134***	-0.199***	-0.186***
	(0.019)	(0.015)	(0.022)	(0.023)	(0.017)	(0.028)
Middle China	-0.041	-0.031	0.001	-0.081**	-0.037	0.042
	(0.027)	(0.022)	(0.033)	(0.031)	(0.023)	(0.039)
East China	0.263***	0.305***	0.315***	0.452***	0.450***	0.463***
	(0.025)	(0.020)	(0.031)	(0.029)	(0.021)	(0.036)
Urban *Hukou*	0.101	-0.017	0.001	-0.028	-0.067*	0.026
	(0.086)	(0.069)	(0.104)	(0.049)	(0.036)	(0.061)
Han	0.003	0.066	0.036	0.086	0.071	0.222*
	(0.068)	(0.055)	(0.082)	(0.102)	(0.075)	(0.128)
Married	-0.032	0.009	0.117***	0.103**	0.123***	0.000
	(0.030)	(0.024)	(0.036)	(0.043)	(0.031)	(0.053)
Divorced/Widowed	0.032	0.051	0.174**	0.047	0.066	-0.052
	(0.060)	(0.048)	(0.073)	(0.066)	(0.048)	(0.082)
Education in years	0.031***	0.043***	0.052***	0.059***	0.070***	0.069***
	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)
Experience in years	0.027***	0.022***	0.015***	0.014***	0.008**	0.018***
	(0.004)	(0.003)	(0.005)	(0.005)	(0.003)	(0.006)
(Exp_sq2)/100	-0.072***	-0.059***	-0.046***	-0.040***	-0.019***	-0.034***
	(0.008)	(0.007)	(0.010)	(0.010)	(0.007)	(0.013)
Technic staff	0.072	0.189**	0.192	-0.121***	-0.145***	-0.210***
	(0.104)	(0.083)	(0.125)	(0.046)	(0.033)	(0.057)
Clerk	0.012	0.016	-0.005	-0.171***	-0.228***	-0.305***
	(0.054)	(0.043)	(0.065)	(0.046)	(0.034)	(0.057)
Service worker	-0.103***	-0.161***	-0.228***	-0.328***	-0.361***	-0.345***
	(0.034)	(0.027)	(0.041)	(0.051)	(0.037)	(0.063)
Production worker	0.026	0.011	-0.100**	-0.299***	-0.374***	-0.355***
	(0.039)	(0.031)	(0.047)	(0.051)	(0.037)	(0.063)
Others	-0.283*	-0.327**	-0.185	-0.302***	-0.334***	-0.187**
	(0.172)	(0.138)	(0.208)	(0.060)	(0.044)	(0.075)
Competitive	-0.079*	-0.108***	-0.027	-0.082**	-0.116***	-0.128***
	(0.046)	(0.037)	(0.055)	(0.037)	(0.027)	(0.046)
Public	-0.147***	-0.158***	-0.062	-0.011	-0.080***	-0.115**
	(0.055)	(0.044)	(0.066)	(0.037)	(0.027)	(0.046)
Others	-0.142***	-0.126***	-0.047	-0.097***	-0.155***	-0.154***
	(0.047)	(0.038)	(0.057)	(0.029)	(0.021)	(0.037)
State-owned	0.055	0.081*	0.044	0.036	0.008	-0.013
	(0.056)	(0.045)	(0.068)	(0.034)	(0.025)	(0.042)
Collective-owned	0.015	0.112**	0.065	-0.026	-0.048	-0.047
	(0.058)	(0.047)	(0.070)	(0.048)	(0.035)	(0.060)
Private-owned	-0.026	-0.036	-0.062	-0.026	-0.003	0.031

	(0.042)	(0.034)	(0.051)	(0.035)	(0.025)	(0.044)
Foreign owned	0.080	0.056	-0.088	0.185***	0.251***	0.388***
	(0.059)	(0.047)	(0.071)	(0.056)	(0.041)	(0.070)
Others	-0.294	-0.324**	-0.248	-0.117*	-0.089*	-0.182**
	(0.193)	(0.155)	(0.233)	(0.068)	(0.049)	(0.085)
Long-term	0.142***	0.089***	0.006	-0.148***	-0.212***	-0.200***
	(0.034)	(0.027)	(0.041)	(0.028)	(0.020)	(0.034)
Short-term/ temporary	0.115***	0.044	0.001	-0.333***	-0.415***	-0.471***
	(0.041)	(0.033)	(0.050)	(0.051)	(0.037)	(0.063)
No contract	-0.013	-0.040	-0.096**	-0.407***	-0.481***	-0.453***
	(0.033)	(0.027)	(0.040)	(0.047)	(0.034)	(0.058)
Others	-0.009	0.208***	0.322***	-0.154***	0.035	0.216***
	(0.044)	(0.035)	(0.053)	(0.057)	(0.042)	(0.071)
Through a referral by friend or family	0.040**	-0.005	-0.028	-0.035	-0.050**	-0.047
	(0.020)	(0.016)	(0.025)	(0.030)	(0.022)	(0.037)
Assigned by the government or through an open examination	-0.036	0.015	0.069	-0.014	-0.035	-0.052
	(0.059)	(0.048)	(0.072)	(0.030)	(0.022)	(0.038)
Through an employment / commercial agency	0.184***	0.163***	0.147***	0.034	-0.044	0.147**
	(0.046)	(0.037)	(0.055)	(0.054)	(0.040)	(0.068)
Others	0.020	0.077**	0.119**	-0.042	-0.078*	-0.018
	(0.042)	(0.034)	(0.051)	(0.055)	(0.040)	(0.068)
firmsize_2	0.122***	0.090***	0.005	0.110***	0.131***	0.131***
	(0.029)	(0.023)	(0.035)	(0.037)	(0.027)	(0.047)
firmsize_3	0.124***	0.067**	0.027	0.170***	0.171***	0.206***
	(0.038)	(0.031)	(0.046)	(0.045)	(0.033)	(0.056)
firmsize_4	0.200***	0.131***	0.027	0.182***	0.217***	0.200***
	(0.035)	(0.028)	(0.042)	(0.041)	(0.030)	(0.051)
firmsize_5	0.177***	0.125***	0.043	0.179***	0.242***	0.267***
	(0.044)	(0.035)	(0.053)	(0.044)	(0.032)	(0.055)
Constant	0.617***	1.088***	1.760***	0.862***	1.533***	1.943***
	(0.122)	(0.098)	(0.148)	(0.158)	(0.116)	(0.198)
Observations	6,435	6,435	6,435	6,290	6,290	6,290

Standard errors in parentheses[36]

*** p<0.01, ** p<0.05, * p<0.1

[36] Table reports the coefficients of explanatory variables at the point of 10%, 50%, and 90% of the entire distribution of logarithm hourly wage with the statistical significance, the following Tables are same.

Table 10.4 Result of quantile regression for rural-urban migrants and urban residents in 2013

	rural-urban migrants			urban residents		
VARIABLES	Q10	Q50	Q90	Q10	Q50	Q90
Female	-0.302***	-0.301***	-0.251***	-0.226***	-0.185***	-0.199***
	(0.098)	(0.042)	(0.060)	(0.029)	(0.014)	(0.023)
Middle China	-0.160	-0.162***	-0.135	-0.081**	-0.072***	-0.096***
	(0.137)	(0.059)	(0.084)	(0.038)	(0.018)	(0.030)
East China	-0.005	-0.012	0.025	0.121***	0.176***	0.175***
	(0.136)	(0.059)	(0.083)	(0.037)	(0.017)	(0.029)
Urban *Hukou*	-0.333**	0.028	-0.060	-0.145**	-0.013	-0.136**
	(0.169)	(0.073)	(0.103)	(0.068)	(0.031)	(0.053)
Han	0.361*	0.188**	0.077	-0.012	0.053*	-0.066
	(0.215)	(0.093)	(0.132)	(0.068)	(0.031)	(0.053)
Married	-0.001	0.003	0.100	0.069	0.019	0.026
	(0.179)	(0.077)	(0.110)	(0.057)	(0.026)	(0.045)
Divorced/Widowed	0.139	-0.011	0.200	0.049	-0.009	0.041
	(0.266)	(0.115)	(0.163)	(0.083)	(0.038)	(0.065)
Education in years	0.035	0.026**	0.058***	0.067***	0.065***	0.075***
	(0.023)	(0.010)	(0.014)	(0.007)	(0.003)	(0.005)
Experience in years	0.022	0.014	0.028**	0.029***	0.021***	0.018***
	(0.021)	(0.009)	(0.013)	(0.006)	(0.003)	(0.005)
(Exp_sq2)/100	-0.060	-0.038**	-0.044*	-0.059***	-0.037***	-0.021**
	(0.042)	(0.018)	(0.026)	(0.012)	(0.006)	(0.010)
Technic staff	-0.139	-0.120	-0.021	0.048	-0.070**	0.062
	(0.242)	(0.104)	(0.148)	(0.069)	(0.032)	(0.054)
Clerk	-0.307	-0.171	0.003	-0.056	-0.167***	-0.043
	(0.294)	(0.127)	(0.180)	(0.069)	(0.032)	(0.054)
Service worker	-0.265	-0.250***	-0.214*	-0.166**	-0.270***	-0.218***
	(0.198)	(0.085)	(0.121)	(0.071)	(0.033)	(0.056)
Production worker	-0.181	-0.094	-0.068	-0.117	-0.187***	-0.124**
	(0.211)	(0.091)	(0.129)	(0.072)	(0.033)	(0.057)
Others	-0.318	0.226*	0.365**	-0.176*	-0.189***	-0.077
	(0.280)	(0.121)	(0.171)	(0.090)	(0.042)	(0.071)
Competitive	-0.050	-0.067	-0.056	-0.080*	-0.086***	-0.090**
	(0.166)	(0.072)	(0.102)	(0.046)	(0.023)	(0.041)
Public	-0.133	-0.106	-0.247	-0.103*	-0.134***	-0.231***
	(0.297)	(0.128)	(0.182)	(0.054)	(0.027)	(0.048)
Others	-0.175	-0.094	-0.092	-0.110***	-0.163***	-0.156***
	(0.166)	(0.072)	(0.102)	(0.041)	(0.021)	(0.036)
State-owned	-0.069	0.117	0.530**	0.021	0.113***	0.074
	(0.364)	(0.157)	(0.223)	(0.057)	(0.029)	(0.050)
Collective-owned	-0.058	0.087	0.415*	-0.085	0.034	0.011
	(0.383)	(0.165)	(0.234)	(0.076)	(0.038)	(0.068)
Private-owned	-0.082	0.119	0.389**	0.057	0.097***	0.139***

	(0.316)	(0.136)	(0.193)	(0.056)	(0.028)	(0.050)
Foreign owned	0.128	0.250	0.646**	0.297***	0.260***	0.260***
	(0.449)	(0.193)	(0.275)	(0.091)	(0.046)	(0.081)
Others	-0.272	-0.047	0.227	-0.041	0.005	-0.012
	(0.357)	(0.154)	(0.219)	(0.067)	(0.034)	(0.060)
Long-term				-0.064	-0.107***	-0.078**
				(0.044)	(0.022)	(0.040)
Short-term/ temporary	-0.468***	-0.120*	-0.070	-0.317***	-0.323***	-0.257***
	(0.161)	(0.069)	(0.098)	(0.053)	(0.027)	(0.047)
No contract	-0.320*	-0.202***	-0.091	-0.362***	-0.308***	-0.231***
	(0.165)	(0.071)	(0.101)	(0.059)	(0.030)	(0.052)
Others	-0.603*	-0.203	0.005	-0.234***	-0.083**	0.150**
	(0.319)	(0.137)	(0.195)	(0.071)	(0.036)	(0.063)
Through a referral by friend or family	0.056	0.006	-0.074	-0.002	-0.034	0.009
	(0.124)	(0.053)	(0.076)	(0.064)	(0.033)	(0.057)
Assigned by the government or through an open examination	-0.019	-0.056	0.200	-0.019	-0.041	-0.037
	(0.317)	(0.137)	(0.194)	(0.066)	(0.033)	(0.058)
Through an employment / commercial agency	0.101	0.108	0.021	-0.028	0.016	0.052
	(0.221)	(0.095)	(0.135)	(0.073)	(0.037)	(0.065)
Others	0.280	0.184	0.219	-0.097	-0.035	0.093
	(0.297)	(0.128)	(0.182)	(0.077)	(0.039)	(0.068)
firmsize_2	0.155	0.070	0.043	0.104**	0.066***	0.023
	(0.148)	(0.064)	(0.091)	(0.044)	(0.022)	(0.039)
firmsize_3	-0.135	-0.041	0.014	0.150***	0.050*	0.068
	(0.202)	(0.087)	(0.124)	(0.051)	(0.026)	(0.045)
firmsize_4	0.195	0.080	0.010	0.196***	0.094***	0.104**
	(0.207)	(0.089)	(0.127)	(0.049)	(0.025)	(0.044)
firmsize_5	0.428*	0.197*	0.001	0.158***	0.163***	0.182***
	(0.237)	(0.102)	(0.145)	(0.054)	(0.027)	(0.048)
Constant	1.733***	2.298***	1.985***	1.000***	1.797***	2.294***
	(0.605)	(0.261)	(0.370)	(0.194)	(0.098)	(0.173)
Observations	1,173	1,173	1,173	7,815	7,815	7,815

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1